The Harvard Computing Group

presents

A Development Plan

for the

Egyptian Software Industry

10th October 1999

Prepared by

The Harvard Computing Group, Inc.

Regency Park

238 Littleton Road

Westford, MA 01886 USA

+1 978-692-6766
+1 978-692-1864 FAX

info@harvardcomputing.com

Background Information

The Harvard Computing Group, Inc.

The Harvard Computing Group was founded in 1994 to help organizations select, develop and deploy workgroup solutions more effectively. Since that time, HCG consultants have improved the productivity and financial performance of numerous organizations. In addition, HCG has trained several thousand people to use the Internet and workgroup technologies more effectively.

HCG works with organizations that need rapid business and technical change to occur in their operations. We provide the framework and help develop a road map for our clients. Our skills in both management and technology consulting permit us to create effective change for our clients.

Table of Contents

Overview and Situation Analysis

Overview

Harvard Computing Group, Inc. (HCG) is pleased to submit this Development Plan for the Egyptian Software Industry. We have spent many months working with firms in the Egyptian software industry as well as representatives from education and government, and appreciate the time and effort expended by everyone who contributed insight and knowledge to the development of this plan. We have tried to build on their knowledge to create a means for Egypt to develop a world class offshore programming industry.

We considered two approaches for the development of the Egyptian software industry. We looked at developing the industry merely by assisting with the expansion of existing firms. We also considered a much more comprehensive strategy to develop and dramatically expand the industry by changing some aspects of the industry itself.

Ultimately, we selected and are proposing the second alternative. We believe it will provide the best long term growth opportunity and will allow the Egyptian industry to make the most effective use of lessons learned from other countries that have already built successful software export programs.

This plan should remove many of the barriers facing those companies that are currently trying to export their software products and services. It should also create new opportunities for the most aggressive companies and allow them to flourish in new markets.

Each of the sections in this document describes a key element that is necessary for the development of the industry and details the next actions that will move the industry closer to its goals.

This plan is ambitious. It depends on both industry and public funding and will cost many millions of dollars to implement. However, as the goal of the plan is to produce an export-led industry producing up to US$500 million within 5 years, the investment should be paid back many times over.

> **The overriding goal of this plan to provide the environment and resources for Egypt to become a major exporter of software products and services, resulting in the development of a <u>$500 million export industry</u> within five years of its adoption.**

The Software Development Plan

This document provides an overview of the plan for the development of the software industry in Egypt. It is based on input from many interviews with companies and organizations within Egypt, and a detailed review of the success factors and programs that have helped Ireland, Israel and India to develop their industries.

The plan provides a prioritized set of actions based on current and future industry needs. As each recommendation is made, the resource needs and next stages to develop an implementation plan have been included. Each component of the plan has been addressed

in detail in this document, including research and referential material to support the recommendations held within.

We believe that this document contains enough information to allow ExpoLink and the related parties to make a decision to move forward on all or some of the plan's elements. The decision to create a national program will of course not have to be taken lightly, however, a coordinated effort could provide some excellent results in relatively short timeframes.

Strategy

The plan has made extensive use of experience from other countries already successful in this business area. One factor common to those countries has been a coordinated effort between government, industry, education and finance to provide the ingredients for successful implementation. The strategy to develop the plan follows these principals:

- Best practices from other countries in their industry development.

- Focus on target markets that will provide high demand to grow the industry.

- Development of a strategy that permits higher revenue per employee for Egyptian firms.

- Detailed understanding of entry strategy and requirements for Offshore Programming markets.

- Identification of short term and long term programs and initiatives.

The Marketplace

The demand for Offshore Programming Services has been the primary target for this plan. Needs in this area meet much of the criteria and capabilities for the existing Egyptian firms, with demand that continues to expand significantly.

Information Technology Services Marketplace 1997-2002 (Worldwide)

Consulting category	1997	2002
Strategic Consulting	$301.8 Billion	$622.4 Billion
Enterprise Resource Management Solutions and Systems Integration		
IT Staff and Outsourcing Solutions		

Dataquest and Gartner Group estimates of IT services industry growth over five years

In addition to the large marketplace and opportunity, another key factor in the development of an industry and this plan is the revenue per employee impact. As can be seen from the table below, different countries are producing very different revenue per employee models in this industry. With very little activity in the export category, the average revenue per employee in Egypt is relatively low currently. However, in firms already based in Egypt with some effective offshore or export activities these numbers rise to $40-$50K/year for each employee. The impact of expanding the industry is obvious, much higher revenue per

employee generates significant wealth and income for the firm and Egypt as a whole.

Revenue per employee impact

Country	India	Ireland	Israel	Egypt
Revenue per employee	14K USD	38K USD	140K USD	10K USD
Total revenue per country	2.2 billion USD	6.2 billion USD	2.8 billion USD	$50M USD
Numbers of employees	160,000	180,000	20,000	5,000

Current revenue per employee characteristics in sample Software Export countries

	1999	**2000**	**2001**	**2002**
Estimated number of staff	5000	6000	7500	9000
At $10K per employee	$50 million	$60 million	$75 million	$90 million
At $20K per employee	$100 million	$120 million	$150 million	$180 million
At $30K per employee	$150 million	$180 million	$225 million	$270 million
At $40K per employee	$200 million	$240 million	$300 million	$360 million

Example of increase in revenue per employee and industry development

The impact of expanding the industry is further shown above, with the relative relation between the staffing levels and revenues achieved. This model has provided the foundation of this plan, the revenue goal level has been set by the working group from industry, government and education that helped prepare the framework below. The following page illustrates the content of the plan. This has been prioritized by a representative group of eight Egyptian firms to provide guidance to the importance of many of these factors to their growth and development. As the plan has considered a wide range of factors, areas rated low should not be considered unimportant, just less critical for short-term development of industry members.

A comprehensive survey, recently conducted for the first time the Israel Export Institute in cooperation with the Manufacturer's Association's Software House Organization, presents surprisingly good findings, showed that exports by Israel's software industry in 1997 surpassed $1 billion, a milestone reached nearly three years ahead of their forecasts. Amiram Shore, chairman of the Software House Organization and chairman of the board of M.L.L. Software and Computer Industries reported the news. This illustrates that with the right emphasis, this industry can create tremendous value and growth in a relatively short period of time.

Plan elements and Timeline

The objectives of the plan is to develop and expand the Egyptian software industry export

activities to meet the following goals:

- Create a new export industry sector
- Build an industry sector that will produce up to $500M in exports for Egypt over a period of the next five years.
- Provide guidance for short and long term goals.

All of the elements of the plan have been reviewed by a cross-section of groups in Egypt who have rated them on their importance to the industry. This document represents a follow up document on the topics listed below. In total they cover a very wide spectrum of important aspects for the development of the industry.

Plan subject area	Responsible party(s)				Importance level (Industry rankings)	Timeframe to implement
	G	E	F	I	INDUSTRY	
Primarily government led						
1. **Export Software Organization**	G	E	F	I	H	**1999**
2. **Internet and E-commerce changes**	G	E	F	I	H	**1999-2000**
3. **Domestic growth**	G			I	M	**2000**
4. **Regulatory Reform**						
4a Intellectual property rights	G			I	M	**2000**
4b Customs laws	G			I	M	**2000**
4c Tax laws	G				L	**2000**
5. **Export Promotion**						
5a Trade policies	G				L	**2000**
5b Education of Export Assistance	G			I	L	**2000**
5c Financial incentives (government)	G		F	I	M	**2000**
5d Software Development Enterprise program	G	E		I	L	**2001**
5e Government incentives for staff expansion and development	G			I	L	**1999-2000**
Includes private sector						
6. **Software and Development Parks**	G	E	F	I	H	**2000**
7. **Education System changes**		E		I	H	**2000**
Private sector led						
8. **Software Business Development Centers**	G		F	I	H	**2000**
9. **Financing alternatives and funds**	G		F	I	H	**2000**
10. **Software Industry Development**	G	E	F	I	M	**2000**

> **KEY G = Government, E = Education, F = Finance, I = Industry**
>
> **H = High importance, M = Medium importance, L = Lower importance**

An Integrated Strategy with a modular approach

One factor that has emerged in every successful element of the industry development has been an integrated strategy to affect the change needed in the specific country. Whether this

was driven by a focused effort, involving various groups, or whether driven by individuals working together, success has come from integrated approaches.

By linking Government, Education, Industry and Finance together in common forums, focused on goals that create an environment for the development of the industry has been a winning strategy for each country. Egypt has many of the core requirements for the successful development of the plan, however it also needs particular attention to this issue. This is because there are few forums that cause these groups to work closely together for the development of the software industry. Consequently, programs sponsored by individual groups may have little impact on the development of the industry. Likewise, there is little dialog between education and industry, further causing misunderstanding and additional development work needed for individual firms.

This notwithstanding, we have also tried to identify individual initiatives that could be managed and implemented in a stand-alone manner. This should allow for a tactical approach for those groups, agencies and private sector funding bodies to implement components of the plan, without the need for multi group support or funding. This should allow for flexibility in the implementation phase of the plan. It will also permit the government or private sectors to take the initiative on individual programs.

Situation Analysis

The current development and skills in the Egyptian software market are driven primarily by domestic market requirements. These have produced a good base level of skills in several market areas, but have left some serious shortfalls for the external development in overseas markets.

General Description of the Market

The Egyptian software industry is highly diverse and reflects nearly all of the company types found in more mature markets. There is a definite vitality in the software companies interviewed for this research. Our estimate of the number of staff employed in the industry today (inside Egypt) is in the range of 5,000.

Size of Market	*Number of firms*	*Trends and growth*
• Software products $50M	• 120 companies	• 35% annual growth
• IT market $300M	•	•

Market characteristics of Egyptian Software Industry 1998 *Source: Harvard Computing Group*

The capabilities of many of these firms have strengths in several important areas, but also have limitations in terms of meeting the target requirements in the overseas export marketplace.

As only a few companies in Egypt are exporting products and services to the US and European markets, very little intelligence is being gathered for which application areas and products are in most demand. Further compounding this issue is the fact that education and training institutions are even less capable of making these changes quickly and bringing them into the curriculum.

Marketplace categories

Software Tools	Packaged applications	Tailored applications	Multi-media & Localization
✦ Databases ✦ Application Development tools ✦ New core technologies	✦ Accounting ✦ Healthcare ✦ Shipping	✦ Government ✦ Financials ✦ Manufacturing ✦ Electronic Commerce	✦ Arabization ✦ Multi-media CD-ROMs ✦ Education ✦ Tourism

CONSULTING AND EDUCATION FOR CHANGE SM   ©1998 The Harvard Computing Group, Inc.

Examples of skill set sample in current Egyptian software industry

Target Markets

The major recommendations for the industry can be broken into several sectors. As the domestic marketplace continues to be soft, **most firms looking for dramatic growth should focus on the International markets.** This is where there is already tremendous growth and demand.

The following table shows some of the growth factors and markets that are currently demanding high quality talent and development.

Information Technology Services Marketplace 1997-2002 (Worldwide)

Consulting category	1997	2002
Strategic Consulting	$301.8 Billion	$622.4 Billion
Enterprise Resource Management Solutions and Systems Integration		
IT STAFF and Outsourcing Solutions		

Dataquest and Gartner Group estimates of IT services industry growth over five years

These very large numbers show where the market opportunities are for Egypt to participate significantly in the software industry. More than 50% of the total worldwide consulting opportunity lies in the US marketplace. The very hot areas of IT services have been recently identified in a Hambrecht and Quist study of firms active in this space. These trends have been confirmed by Harvard Computing Group observations of a variety of studies in the US over the past twelve months.

Powerful Growth Sectors in the IT services industry	
• Business Strategy combined with IT Strategy	• Strategic Internet services
• Knowledge Management Systems/data warehousing	• IT staffing (permanent and augmentation)
• Package Implementation: ERP, supply chain management, customer management	• Application outsourcing
• Electronic Commerce – Application development and integration	• Year 2000 remediation (and replacement systems)
• Networking Systems integration	• Business Process outsourcing

Source: Hambrecht and Quist LLC

These technology adoption trends are likely to dramatically increase during the course of 2000 onwards. Many operations have been holding back on major system implementation in order to deal with Y2K issues that have to be resolved this year. This should unleash a backlog of application development opportunities. Harvard Computing believes that the following industries will lead the charge on some of these developments.

Applications	Industries	Potential for outsourcing
• Knowledge Management	Many major industrial sectors: Pharmaceutical, healthcare, telecommunications, engineering, petrochemical, utilities, software, electronics, automotive, aerospace, retail, publishing, media	High but will vary from one industry to another.
• Systems/data warehousing	Pharmaceutical, healthcare, telecommunications, engineering, petrochemical, utilities, process industries, software, electronics, automotive, aerospace, and retail	Medium to low confidence, due to very close relationship between business strategy and data warehouse design. Will likely to be difficult if company does not have local presence and support to the client
• Package Implementation: ERP, supply chain management, customer management	Pharmaceutical, healthcare, telecommunications, engineering, petrochemical, utilities, process industries, software, electronics, automotive, aerospace, and retail	Medium to high confidence for certain application components that can be clearly segmented, outsourcing development could be a clear option.
• Electronic Commerce – Application development and integration	Pharmaceutical, healthcare, telecommunications, engineering, petrochemical, utilities, process industries, software, electronics, automotive, aerospace, and retail	High, but only if confident of local presence and clearly defined quality and delivery from the relationship
• Networking Systems integration	All industries and government sectors	Low for offshore outsourcing. On-site people intensive business.

To really understand the opportunity and target areas in the industry, we believe that a study should be conducted to clearly target these opportunities. Although there are many industry reports on the outsourcing marketplace, most of them do not measure willingness to outsource outside of the country, or segment by application sector. This information will be vitally important to companies and investors determining commitment levels and target markets in the US and elsewhere.

The Research Center in the Export Software Council will be a critically important area to deal with identification of markets, skills and how best to integrate these into the education and institution plans effectively.

Next stages

Once approval of this plan has been made, one of the first tasks should be to determine the market requirements for each of the above applications and what impact needs to be made to address and support those markets in Egypt. This research will provide the guidelines for the development of the industry, and this research and feedback with become the cornerstone of the competitiveness and potential achievement for the plan.

Mike Cunningham

President/CEO

Harvard Computing Group, Inc. October 1999

Financial Estimates

While this plan addresses the various elements essential to the success of the industry, there is a close correlation between the amount of capital investments and where it is best spent to produce results for existing and new companies becoming involved in the industry.

The estimates below are general in nature, and should only be considered as very preliminarily budgetary figures at this stage. We have allocated a range for each group. Over time, it should be possible for many of these programs to be self-funding by industry, once the momentum has been established in the marketplace. As this occurs we would expect the funding levels to decrease accordingly. This has been noted where appropriate.

	Plan subject area	Estimated cost	Estimated cost over the life of the plan (5 years)
Primarily government led			
1.	**Export Software Organization**	**$2 million/annum**	**$10million**
2.	**Internet and E-commerce changes**	**Study costs $1-3 million for new infrastructure recommendations**	**Implementation costs unknown at this time, but would be identified in the study**
3.	**Domestic growth**	**Government incentives**	**Government incentives**
4.	**Regulatory Reform**		
4a	Intellectual property rights	**These costs will primarily be borne by the avocation of the ESO and individual government departments supporting these initiatives**	
4b	Customs laws		
4c	Tax laws		
5.	**Export Promotion**		
5a	Trade policies	**These costs will primarily be borne by the avocation of the ESO and individual government departments supporting these initiatives**	
5b	Education of Export Assistance		
5c	Financial incentives (government)		
5d	Government incentives for staff expansion and development		
Includes private sector			
6.	**Software and Development Parks**	**Estimated staff costs in the region of $1.75-2.0 million. Infrastructure costs need much more investigation and detail before a budget can be developed**	

7.	Education System changes	Costs for the Software Industry Institute need more detail before an estimate could be made. The Offshore Programming Laboratory will likely require funding in the order of $10-15 million to start the operation.
Private sector led		
8.	Software Business Development Centers	For ten Egyptian to participate in the Software Business Development Center, annual costs would likely run from $3-3.5 million
9.	Financing alternatives and funds	Seed funds and capital for start up firms could be significant element of this program. Most of the capital will come from industry itself, however some start up funds, or matching funds could be developed separately.
10.	Software Industry Development	Should be self funded, along with assistance from the Export Software Organization

Export Software Organization

Background

Successful software industry development requires the interaction of several sectors of the economy. In Ireland, a National Software Directorate is responsible for assuring the growth and success of the software industry. It works in tandem with a governmental agency representing the former Trade Board and Board of State Support to Industry to accomplish its mission.

In Israel, under the Department of Industry and Trade, the Chief Scientist Office is responsible for implementing a broad-reaching Law for Encouragement of Industry and R&D enacted to dramatically increase developmental output. This office provides primarily financial and structural support to software companies and funds substantial research at all levels in cooperation with companies, universities and professors.

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│   ┌──────────┐   ┌──────────┐                │
│   │  TRADE   │   │  STATE   │    IRELAND      │
│   │  BOARD   │   │ SUPPORT  │                 │
│   │          │   │    TO    │                 │
│   │          │   │ INDUSTRY │                 │
│   └────┬─────┘   └────┬─────┘                 │
│        ▼              ▼                        │
│   ┌─────────────────────────┐   ┌──────────┐  │
│   │                         │◄──│ SOFTWARE │  │
│   │   ENTERPRISE IRELAND    │   │DIRECTORATE│ │
│   │                         │   │          │  │
│   └───────────┬─────────────┘   └────┬─────┘  │
│               ▼                      ▼         │
│   ┌─────────────────────────────────────────┐ │
│   │          SOFTWARE INDUSTRY              │ │
└ ─ └─────────────────────────────────────────┘ ┘
```
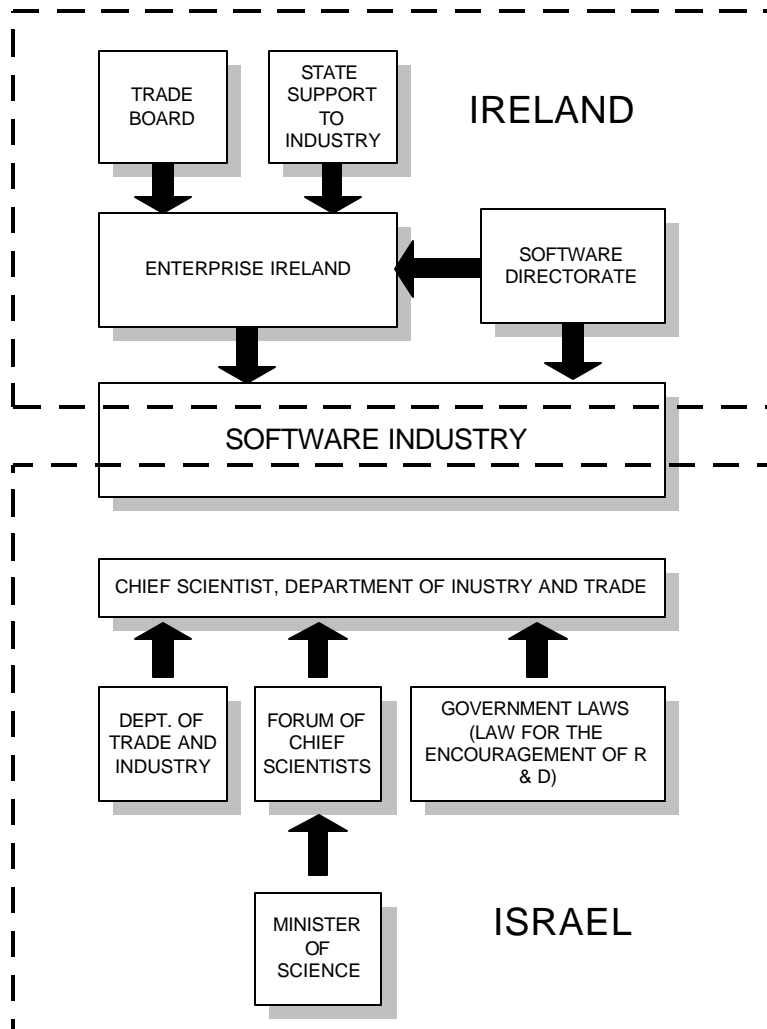

Example of Software Industry development with significant government involvement

In India, support is fragmented with no one organization in a leadership role and the country is financially limited in its ability to fund initiatives for the industry. Recognizing the potential

for this industry, however, the government sponsored the development of a strong industry group, called NASSCOM, to lead initiatives. The government also incorporated several ad hoc panels to research major issues and make recommendations. Most programs requiring substantial funding, however, were launched local governments as part of local development efforts that followed national recommendations.

We recommend that Egypt create an Export Software Organization that would benefit from the lessons learned from each of these very successful nations and their strategies.

Overreaching Mission

The Export Software Organization will work with, and on behalf of, the software industry to assure that it achieves its maximum potential in the local, Middle Eastern and global markets. **The industry goal is to grow export industry revenues to $500 million within five years**.

```
┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│  GOVERNMENT  │  │ FUNDING AND  │  │  EDUCATION   │
│              │  │    TRADE     │  │              │
│              │  │ DEVELOPMENT  │  │              │
└──────────────┘  └──────────────┘  └──────────────┘
        ↕                ↕                ↕
   ┌────────────────────────────────────────────┐
   │            SOFTWARE DIRECTORATE             │
   └────────────────────────────────────────────┘
        ↕                ↕                ↕
   ┌────────────────────────────────────────────┐
   │            SOFTWARE INDUSTRY                │
   └────────────────────────────────────────────┘

┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│  GOVERNMENT  │  │ FUNDING AND  │  │  EDUCATION   │
│              │  │    TRADE     │  │              │
│              │  │ DEVELOPMENT  │  │              │
└──────────────┘  └──────────────┘  └──────────────┘
        ↕                ↕                ↕
   ┌────────────────────────────────────────────┐
   │         Export Software Organization        │
   └────────────────────────────────────────────┘
        ↕                ↕                ↕
   ┌────────────────────────────────────────────┐
   │            SOFTWARE INDUSTRY                │
   └────────────────────────────────────────────┘
```
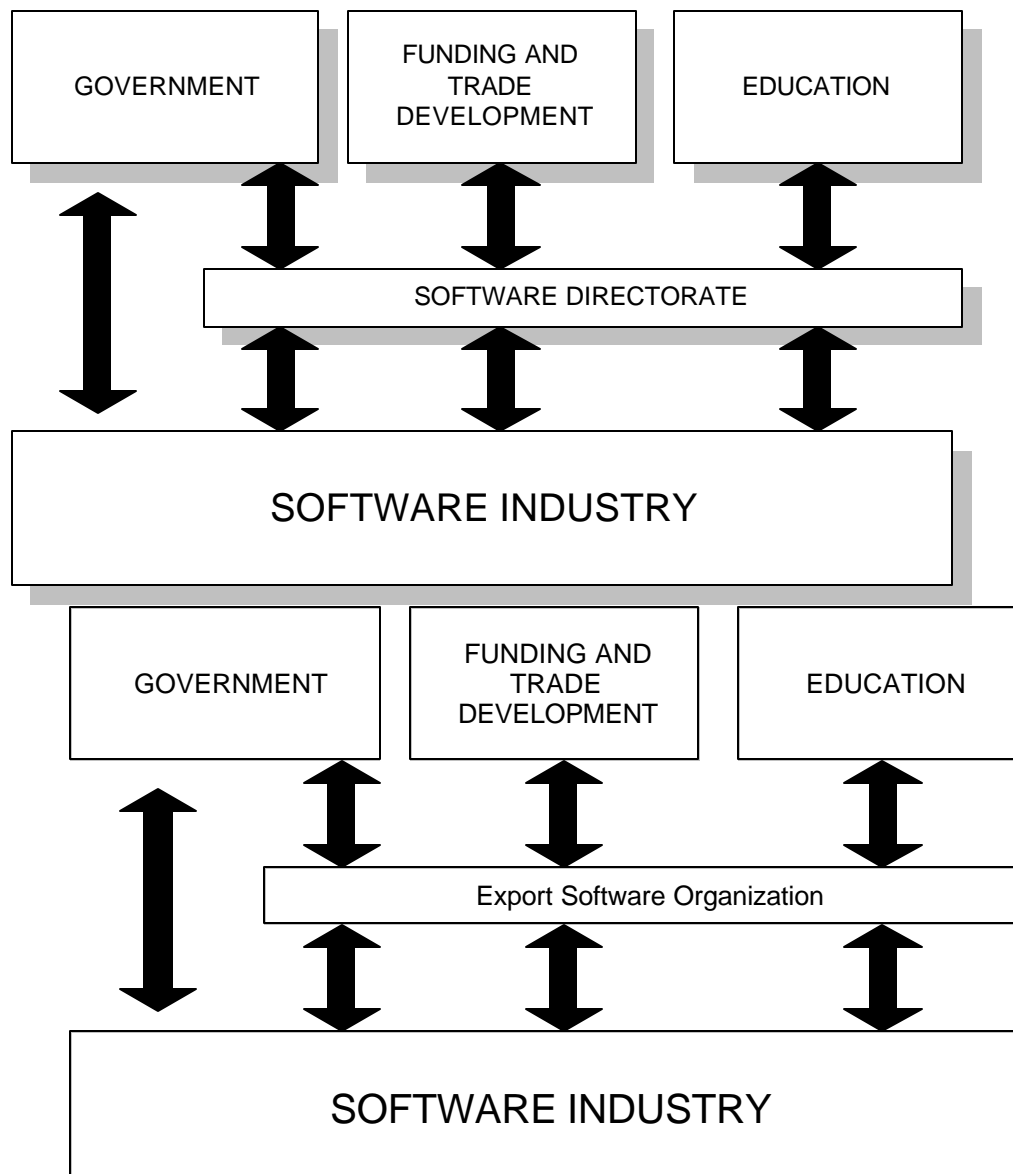
Example of Export Software Organization Activities for the development of the Egyptian software industry

We recommend that the Export Software Organization employ a mixture of techniques that have worked well in Ireland and Israel, particularly for the government and education components, combined with forging very tight links with industry, which has been successful in India.

The Export Software Organization will be a central resource for promoting the development of software companies specifically for exports of services or products. It will work with governmental agencies and departments, with educational departments and the software industry association and with various interest groups on behalf of the industry.

The Export Software Organization will provide focus, liaison and an action-oriented mechanism to ensure that changes and modifications to the industry strategies can be developed and implemented as quickly as possible. The intent is not to create a bureaucracy that will add a layer to the process, but one that will bridge the needs of the target markets for the industry, with the supply of well priced and able resources. Only if this occurs will the true potential of this marketplace be realized.

Charter Elements

The Export Software Organization will focus on the important elements outlined below, which will position the Organization as the centralized force in building the industry to it maximum potential.

Charter elements should include:

1. **Work with and lead the industry in long-term planning and in identifying desirable initiatives to assist the industry in growth.**

2. **Raise awareness of potentially detrimental issues confronting the Egyptian software industry and lead in the development of action plans.**

3. **Work with the industry to exploit opportunities as they arise.**

4. **Advise the government on software industry needs and advocate for the industry within the government.**

5. **Coordinate government activities and manage government programs and funding directed to the software industry. Manage the investment of "seed funds" in new and emerging software firms to promote the growth of new viable enterprises.**

6. **Interface with national government agencies on behalf of the industry. Integrate government policies involving various state agencies and the industry.**

7. **Identify, solicit and manage the delivery of international programs available to the Egyptian software industry.**

8. **Interface with local governments to develop infrastructures and programs conducive to software developmental needs.**

9. **Work with the public and private educational system at all levels to expand the number of qualified software engineers matriculating from the institutions and available to the industry. Set and enforce measurable goals.**

10. **Promote the industry and coordinate activities in government, in education, in domestic and foreign trade groups and among the general populous.**

11. **Develop and maintain comprehensive industry statistics and information.**
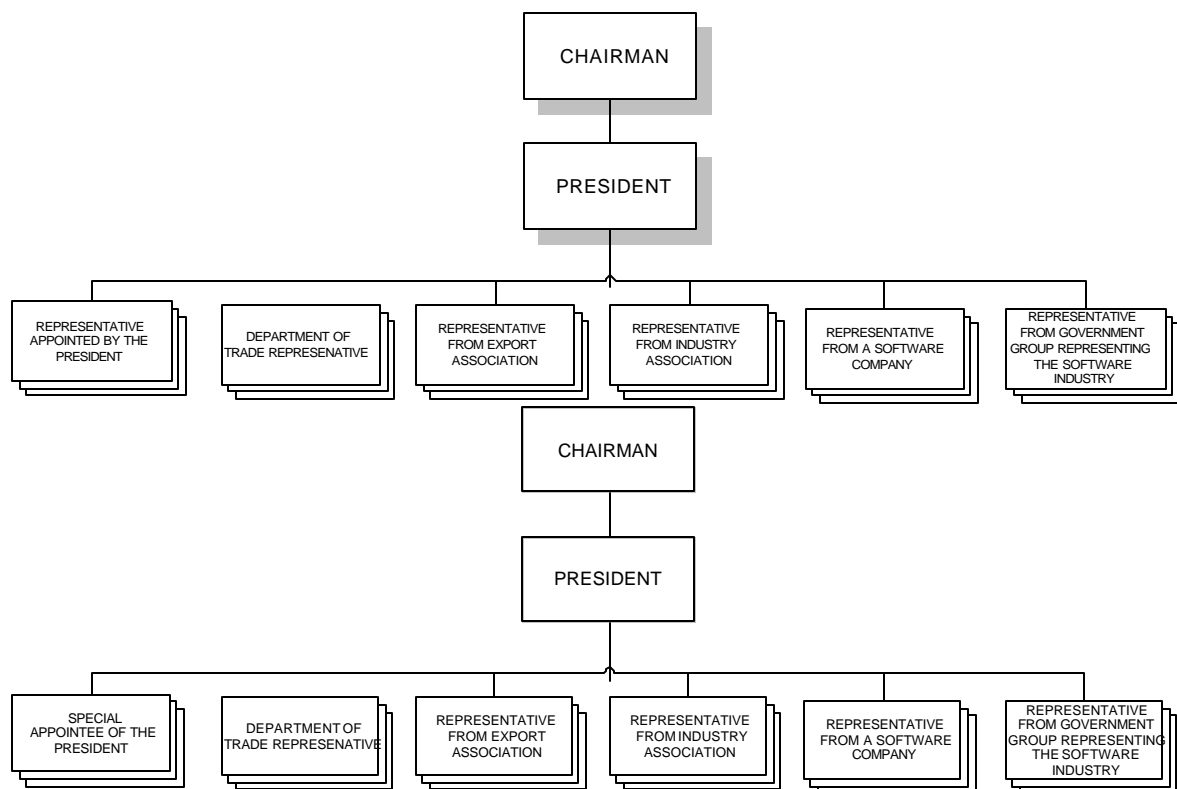

Development Plan

If all parties act aggressively in support of this plan, there is no reason that the Export Software Organization could not be founded within 6 months of the launch of the plan. This should allow time for the following factors to be considered in this plan.

1. A review by Government, Education, Industry already involved in the initial development of the program.

2. Decisions and financing to be made available to support its implementation.

3. Building a plan that can be developed and implemented incrementally.

Launching the Export Software Organization

Several steps need to be taken to launch the Export Software Organization and to ensure that the charter and necessary resources are in place for the successful start up of the Organization.

```
                          CHAIRMAN

                          PRESIDENT

  REPRESENTATIVE   DEPARTMENT OF    REPRESENTATIVE   REPRESENTATIVE   REPRESENTATIVE   REPRESENTATIVE
  APPOINTED BY THE TRADE            FROM EXPORT      FROM INDUSTRY    FROM A SOFTWARE  FROM GOVERNMENT
  PRESIDENT        REPRESENATIVE    ASSOCIATION      ASSOCIATION      COMPANY          GROUP REPRESENTING
                                                                                      THE SOFTWARE
                                                                                      INDUSTRY

                          CHAIRMAN

                          PRESIDENT

  SPECIAL          DEPARTMENT OF    REPRESENTATIVE   REPRESENTATIVE   REPRESENTATIVE   REPRESENTATIVE
  APPOINTEE OF THE TRADE            FROM EXPORT      FROM INDUSTRY    FROM A SOFTWARE  FROM GOVERNMENT
  PRESIDENT        REPRESENATIVE    ASSOCIATION      ASSOCIATION      COMPANY          GROUP REPRESENTING
                                                                                      THE SOFTWARE
                                                                                      INDUSTRY
```

Membership of the Export Software Organization Board of Directors

Activity	Action

Secure initial funding from governmental sources	Government or private sector provides funding of sufficient magnitude to cover general operational expenses (not program expenses) for one year confirming its commitment and enabling the development of a structured organization
	Government sets aside/allocates additional funds out of current budget for release after the development and approval of program spending plans
	(The ESO could be funded by other means, including local PVOs (Private Venture Organizations), and export focused assistance operations such as USAID or European organizations.
Form Board of Directors with responsibility for project launch	Form Board of Directors consisting of senior representatives from: - Department of Trade - Department responsible for Support to Industry - Representative of the President - Representative of the Export Association - Representative of the Industry Association 1 representative from a Software Company Each committee member needs to have the authority to second one middle level manager from his organization to assist the Organization through a substantial time commitment

Activity	Action
Initial Board of Directors duties	**Organizational**
	Select a Chairman for the initial year from the Board of Directors
	Time commitments for Board of Directors is estimated to be 20% during Year 1, 50% for the Chairman
	Formalize Board of Directors' structure
	Identify roles and responsibilities of Board members
	Formalize overall approval process
	within the Organization and the Board of Directors
	within greater governmental structure
	Secure the services of a full-time President/CEO for Year 1
	President should come from a senior role in the software industry and, ideally, should have experience in government. This role will require strong capabilities in strategic planning, leadership, team building, and working with government functionaries and entrepreneurial management. This individual must be able to find innovative ways to accomplish their objectives
	Formalize initial funding details together with budget, accounting and financial approval processes
	Processes should be extremely tight to build a strong reputation for the organization as an efficient well-run group and to assure that all funding is used in the most effective manner
	Secure office space and equipment, and hire needed staff
	Operational
	Formalize/approve Mission Statement
	Approve Charter elements
	Establish high level timeline for Year 1 activities

Initial Board of Director duties and activities

In the development of the Export Software Organization charter, the selection of the President of the Export Software Organization becomes a critical element. Our recommendation would be to find an external candidate who has had experience and successful involvement in the development of these programs in the past. The background and experience level of the President will be key for the success of the Organization. They should have the following skills and background:

- Practical experience in the development and management of international software businesses

- International experience in the development of software industries in Ireland, Israel or India

- Proven track record of working successfully with quasi-government organizations

- Willingness to relocate to Egypt for extended period of time (1 year contract with options to renew for up to 3 years)

In addition to the Organization, it will be important that certain advisors be available to provide input and feed back on activities and programs operated by the Export Software Organization. These advisors can provide useful supplementary resources to the Organization, providing specialized input, opinions and services on an as needed basis to the Organization.

Various outside groups will take actions defined by the Export Software Organization and then develop and implement programs accordingly. This will ensure several important factors in the operation of the group including:

- The Export Software Organization does not become a large organization that has overlapping functions with industry, government or education groups.

- The Charter will focus on determining goals that are implemented through the working groups reporting to the Export Software Organization

- The Export Software Organization will have control over certain elements directly, either by staffing them directly or contracting the resources accordingly.

- The responsibility for making operational changes will be driven down to the appropriate working.
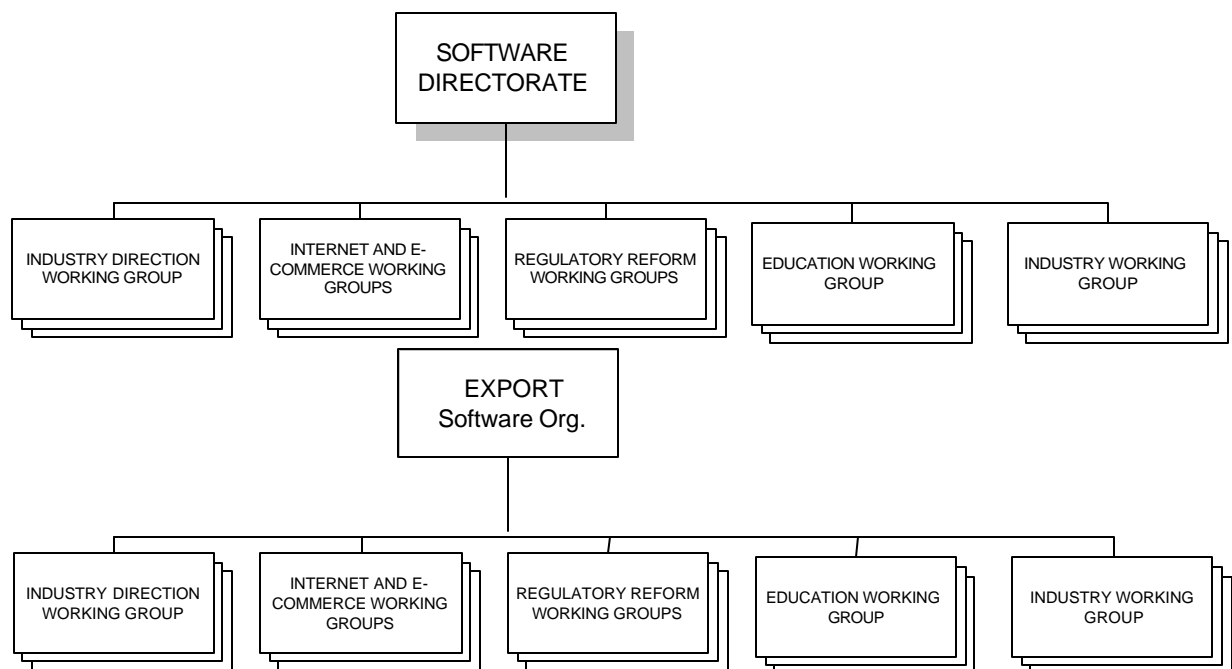
Model illustrating how working groups will report their progress to the Export Software Organization

As shown in the model above, we recommend that the *Export Software Organization* provide direction to the various working groups for the industry. Each one of these working groups will have the staff and resources to achieve the goals agreed in advance. These groups will then provide feedback and results back to the *Export Software Organization* on a project by project basis. This model should maximize the contribution of each working group but minimize the overlap between groups.

In addition to the working groups listed above, additional groups can be added as appropriate.

Certain functions will need to be managed directly by the *Export Software Organization* in order to provide necessary direction for the industry. These will include:

- Creating a Market Research Center for the Software Industry. This center will provide up-to-date information on the state of the software industry, particularly in the target export markets, and relay this feedback to industry, education and government programs to best position the Egyptian software industry.

- Development of regular training and education programs to keep the software industry group members up to date on trends and developments.

- Development and delivery of a benchmarking study to be delivered annually. This will be a report card on the progress of the industry's development against the plan.

Resources to provide these services will need to be included in the Charter of the Organization.

Roles and Responsibilities

We recommend the following roles and responsibilities for Board members and working groups:

Role	Responsibility
Chairman	Provides direction and advice to the Export Software Organization, and ensures that the President and Board Members are maintaining their focus on the charter of the group.
President	Responsible for the development and implementation of the Industry Software Plan for Egypt. Acts as liaison for industry, education, finance and government.
Board members	Responsible for their individual areas of expertise and involvement in the Export Software Organization, also responsible for the success of the Industry program
Working Group members	Responsible for the successful development and deployment of programs in each sector of the plan. Report back to the Export Software Organization, and are measured each year on their success in meeting plan goals.

Market Research

An important element of the Export Software Organization's work will be to develop a research program to advise Egyptian offshore development companies of the business opportunities in the North American market. The program would consist of three parts:

1. Research, development and delivery of Offshore Development and US Market Reports.

2. Presentation of Market Research at offshore development conferences in Egypt.

3. Quarterly updates of the Offshore Development Market Report information.

In addition to the Offshore Market Research, the Export Software Organization will also need to ensure that good market intelligence is broadcast back into the software industry and associated groups. The development of this Market Research arm will ensure that the

programs are effective and meeting the various requirements of differing elements of the marketplace. Education institutions, in particular, will need this input to ensure that they are offering the most effective and relevant courses to their students. They will also want to ensure that they are developing the skills and capabilities that most useful for generating high levels of revenue per employee in Egyptian software companies.

Sample market information needed could include:

- Expected size of the North American offshore software development market, for the next four quarters and for next 1-3 years
- Expected growth rates
- Market segments likely to have strong and sustained growth
- Forecast and outlook for the following key segments:

> Mainframe and enterprise systems
>
> BackOffice systems
>
> Client-server computing
>
> Operating systems
>
> Databases
>
> Groupware
>
> E-commerce
>
> Customer Management Systems
>
> ERP
>
> Data Warehousing

- Vertical segments including:

> Financial/banking, Manufacturing, Transportation,
>
> Government, Retail, Utilities

- Other factors impacting offshore software development:

> Competitiveness
>
> Project Management

Next Stages

The next stages outlined in this document represent the next logical moves in the creation of the Export Software Organization. The people involved in creating the Organization should also consider visiting successful Software Organizations in other countries.

Visits to Ireland, Israel and India could assist in the formation and understanding of each organization's successful and more difficult transitions. Seeing where others have struggled should help avoid expensive mistakes in the early stages of development.

The industry development model we are proposing takes advantage of Egypt's desire to have this program led primarily by the software industry, but it actively encourages participation of other groups to achieve optimal results.

Funding for this program could potentially be driven from export-led organizations such as US-AID and European AID groups. These groups have the advantage of having support for software related programs in their charter and focus.

Short term/long term

The Export Software Organization should be considered a short-term implementation. This would be in the category of 6 months from adoption of the plan at a nationwide level.

The short-term tasks of the ESO will include:

- Development of the framework of the program and the organization

- Commence the research programs

- Deliver of training and education programs to the industry

Longer-term tasks would include:

- Development of the working groups with government organizations

- Ensuring the longer term elements of the plan are being implemented and supported

Costs

We would expect the operating costs for the Software Directorate to be in the region of $2 million per annum. This is based on the following criteria:

Staff costs

Positions	Salary	Number of staff	Sub-total
Administration	20000	3	60000
Director	400000	1	400000
Deputy-Director	250000	1	250000
Software Sector Mgrs.	15000	3	45000
IT support	20000	1	20000

Assuming benefits at around 25% of salary levels, we would expect the staff costs to run around $1 million per annum.

Other allowances for the Export Software Association include:

Staffing	Equipment	Travel	Events	Facilities	Other
$968,750	100000	100000	500000	75000	250000

This would make the total operating budget for the department in the range of $2 million per annum. As the Export Software Organization would be supporting exhibitions and delivering

conferences to the industry, the events budget is likely to be high. In addition, the acquisition and the development of relevant research materials for the industry would be significant.

Costs should start to diminish during the later years of the plan. As the industry matures there will be industry level funding of the ESO, thereby offsetting costs. Also there should be a lower need for new development programs as the industry starts to propel itself with greater market penetration and success.

Internet and E-commerce

There are many higher-speed technologies that could be deployed in Egypt to enhance Internet access. Some require large-scale telecommunications infrastructure investment and changes, while others are less intrusive.

We have summarized the key aspects of leading network technologies in the Technology Overview section later in this section. The alternatives we present are not mutually exclusive, in fact, a combination of them will be used to enhance communications for various companies, software parks, Internet Service Providers (ISP), universities, government agencies and consumers in various locations throughout Egypt. While our review and recommendations focus primarily on enhancing communications for software companies, the concepts can be extended to the other organizations listed above.

There are actually two classes of problem to solve in providing software companies with the quantity and quality of Internet access that will allow them to be competitive in the world market. Please refer to the list and diagram below.

1. Connections from Egyptian Internet Service Providers to the Internet

2. Connections from software companies (subscribers) to Egyptian Internet Service Providers

Egyptian Internet Connections
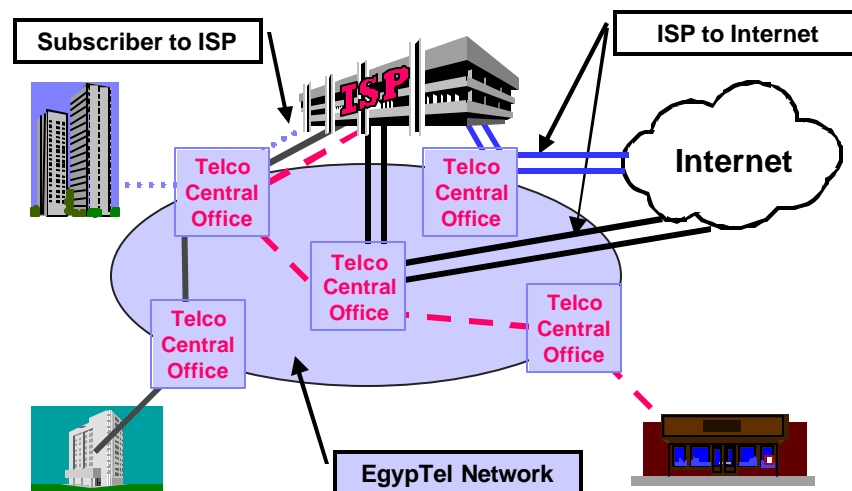
© 1999 Harvard Computing Group, Inc.

Many of the technologies described below are suitable for both types of connections, while others may be better suited for just one. In this report, we have focused most of our attention on the subscriber-to-ISP link. It is critical, however, that the total bandwidth connecting Egypt to the Internet be increased in order to support higher-speed access within the country.

Recommendation Summary

It is important to understand that this document is not a network design for a new Internet infrastructure. Rather, it recommends ways in which Telecom Egypt, the government and private industry can work together to better support Egyptian software companies. It also recommends several combinations of network technology that could provide the basis for solid growth in Internet usage and effectiveness in Egypt.

We have made our recommendations based on several assumptions:

• Software companies cannot compete effectively in world markets without high-speed Internet access.

• Nearly all of the existing Egyptian software companies are located in or near Cairo. We have not forgotten about the handful of software companies in Alexandria and recognize current government incentives for software companies to locate in other areas of the country, but we have provided the most detailed recommendations for software companies in the Cairo metropolitan area.

Phase 1: Software Companies and Parks

Telecommunications Infrastructure

During Phase 1, Telecom Egypt and the Egyptian government will need to invest in new or enhanced communications infrastructure. We have selected a technology strategy that we believe will produce significant bandwidth improvements with minimum investment. (This would require the minimum change the current system, and will supplement the new systems).

In addition to public infrastructure investment, the government may need to provide subsidies for software companies so they will be able to make the capital investment required on their ends of the enhanced communication links. The principal benefit for making these capital investments, however, will be to enable Egyptian software companies to be serious competitors in the world software market.

Subscriber-to-ISP Connections

Enhanced Connections

Internet Infrastructure Scenario 1 is most like the situation today, in which each subscriber is connected to an ISP and each ISP is connected to the IDSC/RITSEC backbone. There are one or two ISPs, like GegaNet, that connect directly to the Internet without passing through the IDSC/RITSEC backbone (as depicted by the ISP on the bottom of the picture).

The key change in this diagram is the use of wireless links to provide significantly greater bandwidth without the requirement to lay new cables. In addition, the picture shows use of a variety of wired technologies that could be deployed over copper or fiber circuits.

Internet Infrastructure Scenario 1
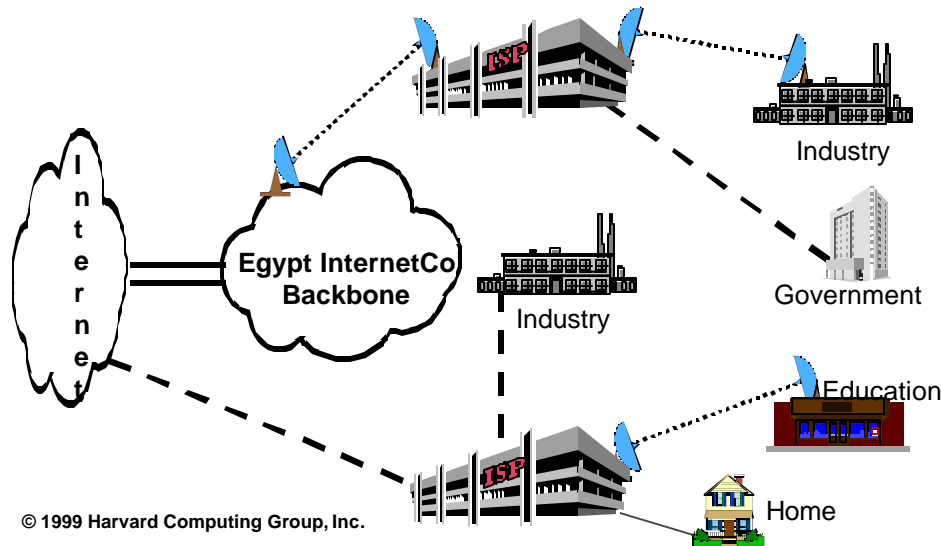
© 1999 Harvard Computing Group, Inc.

Key for Internet Infrastructure Diagrams

RF or Laser Links
(1.5 to 622 Mbps)

xDSL, ISDN, FT-1, T-1/3, EtherLoop
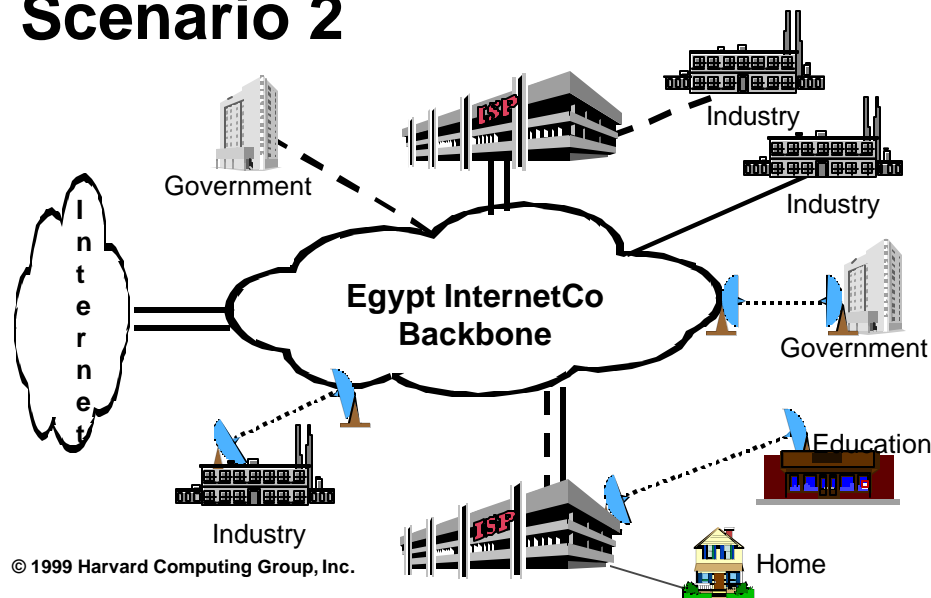(128 Kbps to 45 Mbps)

VDSL, T-1/3, OC-3+, ATM
(1.5 to 622 Mbps)

Internet Infrastructure Scenario 2 is built on an entirely different foundation. In this diagram, the IDSC/RITSEC backbone, or that of a privatized backbone company, is deployed throughout the Cairo metropolitan area, and eventually throughout the rest of the country. The backbone network is built using frame relay or ATM technology and everyone, subscribers and ISPs alike, connect to the network cloud. There will be some organizations, and most residential subscribers, who will still connect directly to an ISP through the public telephone network, but as a rule, organizations connect directly to the backbone.

There are several advantages to this scenario, most of which revolve around flexibility and cost savings. Connecting subscribers to a packet/cell network allows communication links to be used much more efficiently because data traffic tends to be very bursty and there is considerable idle time on dedicated circuits. Subscribers will generally get better performance at lower cost by have short connections to the backbone than they would by paying higher charges for dedicated links to their ISPs.

In addition, software companies, government and universities, by virtue of all being connected to the same high performance network, have an enormously expanded range of communication possibilities amongst themselves (security issues of using a shared network can be dealt with reasonably effectively by current firewall products).

Finally, being connected to a backbone network rather than directly to one ISP gives subscribers very real choice in moving easily from one ISP to another if they are not getting acceptable service from their present ISP. Making this move in scenario 1 requires installing a new dedicated link to the new ISP – a source of considerable hassle and expense and made worse by the typical waiting time in Egypt to have new telephone lines installed.

Internet Infrastructure Scenario 2

Government

Industry

Industry

Egypt InternetCo Backbone

Internet

Government

Industry

Education

Home

© 1999 Harvard Computing Group, Inc.

Key for Internet Infrastructure Diagrams

··············	RF or Laser Links (1.5 to 622 Mbps)
– – – –	xDSL, ISDN, FT-1, T-1/3, EtherLoop (128 Kbps to 45 Mbps)
———	VDSL, T-1/3, OC-3+, ATM (1.5 to 622 Mbps)

Government Policy on Wireless Links

A final issue concerns government policy and regulations for communications links in Egypt. As noted in the wireless technology section on page 44, there are several wireless

technologies that could provide superior bandwidth with very short lead times. For example, one system from Canon would allow a software park to connect to an ISP virtually overnight, providing access at tens of millions of bits per second for a one-time cost of less than US$30,000 – far less than the annual rental (external telephone company plus Telecom Egypt surcharge) of a lower speed telephone line. These services could change connectivity characteristics rapidly.

The Egyptian government has been concerned in the past with losing their ability to monitor communications that take place on private point-to-point circuits of this type. Consequently, policy makers must resolve the conflict between the need for communications oversight and providing the infrastructure to build a world class software industry. (Obviously security remains a concern for all governments, however, there have been many improvements in these technologies over recent years.)

ISP-to-Internet Connections

One of the early actions taken from this plan should be to increase the total bandwidth from Egypt to the Internet. It makes very little sense to seed Internet demand within the country, and to increase speeds between users and their ISPs, if the backbone connections to the Internet can not handle the increased load.

In addition, increasing the bandwidth to the Internet is essential to improving the perception of Egypt's technical capabilities to the outside world. The simple fact today is that most web sites hosted in Egypt are extremely slow when viewed from outside the country – even sites for technology organizations like RITSEC (www.ritsec.com.eg) are measurably slower to load than they should be. Some software companies and several budding E-commerce firms in Egypt have taken to hosting their web sites outside of Egypt in order to improve page loading speeds. The question that arises is how can a software firm in Egypt possibly sell a US firm on their technology prowess if it takes 45 seconds to load their home page.

A related issue that needs to be explored immediately is whether privatization of the Internet backbone currently managed by IDSC and RITSEC is appropriate in the future. There are no simple answers to this question but it is quite possible that a commercial organization with a sole focus on building and managing the Internet backbone in Egypt would offer superior service and economy.

Next Actions – Phase 1

It should be clear from the complexity of the technologies and the financial, geographic and logistical realities of installing network facilities that the decisions to be taken next are not simple. We recommend the following steps:

1. The Egyptian government should hire a consulting firm that specializes in large-scale network infrastructure design, preferably a firm with Internet backbone knowledge and experience working on networks with a country-wide scope.

2. The government should create a task force with oversight responsibility for Phase 1 network design and deployment. Membership should include representatives from at least the following organizations:

   - Export Software Organization

- RITSEC
- IDSC
- Ministry of Transportation and Communications
- Telecom Egypt
- MobiNil
- Click GSM
- Phase 2 task force

3. The Phase 1 Task Force and government-hired consultant should develop and publish a project plan and set target dates that will lead to the roll out of Phase 1, 2 and 3.

4. The Phase 1 Task Force should work with the appropriate ministries to secure budget approval and funding for the network upgrade project.

5. The Phase 1 Task Force should manage a pilot project to implement new, higher speed technologies for one ISP and several software companies.

6. The Phase 1 Task Force and the Export Software Organization should identify and talk to those software companies that are most likely to need enhanced Internet connections. The discussions should center around the following key issues:

- capital funding,
- ongoing expenditures for recurring and usage charges, maintenance and support,
- internal network and hardware upgrades,
- software upgrades,
- training,
- securing landlord approvals (if new wiring or antenna will be required).

7. The Phase 1 Task Force should evaluate whether privatization of the RITSEC-controlled Internet backbone in Egypt is appropriate and, if so, create a plan for achieving that goal.

8. The Phase 1 Task Force should evaluate current bandwidth between Egypt and the Internet and prepare a plan to increase that bandwidth commensurate with the expected growth of Internet usage in Egypt.

9. The Phase 1 Task Force should determine whether any universities or government agencies should be included in the Phase 1 deployment rather than waiting for Phase 2 (see the description of Phase 2 below.)

10. The Phase 1 Task Force should work with the government, Telecom Egypt and others to ensure that suitable Internet infrastructure is provided in 10th of Ramadan, 6th of October and other cities where software companies are being encouraged to locate.

Phase 2: Cairo Metropolitan Area

Once the needs of the software industry have been met, the infrastructure changes from Phase 1 should support growing demand from other sectors of the economy. E-commerce development, application hosting and other topics discussed under Related

Recommendations on page 31 will all generate bandwidth demand within the country and to other parts of the world.

Universities

Early in Phase 2, or perhaps during Phase 1, leading universities in Egypt should enhance the speed of their connections to the Internet. Government funding may be required, however, the Phase 2 task force should seek grants from network equipment providers and computer hardware and software vendors for this purpose. It may even be possible to secure grants during the bidding and contract negotiations with the firms vying to provide network infrastructure equipment.

Government

During Phase 2, selected government agencies with higher bandwidth requirements should be allowed to upgrade their connection speeds. Military and other specialized organizations may need to upgrade during Phase 1.

Increasing and Satisfying Commercial Demand

While Phase 1 of this plan is being deployed, it will be important to work with sectors other than software to understand their bandwidth needs. Specific programs to stimulate demand in other sectors will probably be appropriate, along with promotional activities to let people know how much better the infrastructure has become.

Increasing Consumer Demand

ISPs in Egypt are currently doing a good job of recruiting new customers but consumer demand is limited by the sheer number of PCs in Egypt. Programs to lower PC prices at retail, perhaps using the "free PC" model being tried in the UK, US and other countries, could help.

The government or Export Software Organization may want to consider launching a campaign to heighten awareness of the power, versatility and usefulness of the Internet. This type of Internet literacy campaign, perhaps aimed at developing a sense of national pride by positioning Egypt as the "most wired nation" in the region could be effective. Because Egypt already enjoys a reputation as the leading source of software expertise in the Gulf, and because of the close links between the software industry and the Internet, it is a logical extension of Egypt's software reputation to position Egypt as an Internet leader.

Next Actions – Phase 2

We recommend the following actions:

11. The government should appoint a Phase 2 Task Force to plan for the roll out of enhanced Internet bandwidth throughout the Cairo area.

12. The task force should evaluate technologies and lessons learned from the deployment of Phase 1 in selecting the best network alternatives for the rest of Egypt.

13. One member of the Phase 2 task force should be a delegate to the Phase 1 task force to ensure consistency and continuity between the two phases of Internet development.

Phase 3: All of Egypt

Extending enhanced Internet access to all of Egypt in Phase 3 will be a significant challenge, but the infrastructure enhancements and lessons learned in Phases 1 and 2 will make the work easier. It will be critical to define areas of highest demand and evaluate then-current technologies to select the best fit.

Next Actions – Phase 3

We recommend the following actions:

14. The government should appoint a Phase 3 Task Force to plan for the roll out of enhanced Internet bandwidth throughout the country of Egypt.

15. The task force should determine priorities and develop a plan for deploying higher-speed Internet access to Alexandria, 10th of Ramadan, 6th of October, Upper Egypt, Sinai and other areas of the country.

16. The task force should evaluate technologies and lessons learned from the deployment of Phases 1 and 2 in selecting the best network alternatives for the rest of Egypt.

17. One member of the Phase 3 task force should be a delegate to the Phase 2 task force to ensure consistency and continuity between the two phases of Internet development.

Related Recommendations

E-commerce Development

In addition to the extensions and improvements to the Internet, there are a number of opportunities for Egypt to take advantage of E-commerce technology in other spaces.

Development of E-commerce initiatives make a great deal of sense for many industries in Egypt, particularly ones that are impacted by supply chain characteristics where manufacturers could get closer to potential partners and end users as a result of the activities.

The following table illustrates some of the US based E-commerce activities and companies that have implemented them in the US. Some of these industries would be candidates in the Egyptian marketplace.

Industry	Applications	Example
Banking	On-line banking	BankBoston
High tech manufacturing	Supply Chain management	Cisco Systems
Insurance	Policy applications	Intuit
High tech wholesalers and retailers	Procurement and auctions	OnSale.com
Education	Distance learning	NTU
Clothing and retail	Configuration management and E-commerce	Lands' End
Telecommunications	Video-conferencing	A T & T

Publishing	Business to business content, newsfeeds	Ziff Davis
Stock market	Stock trading	Charles Schwab

Supply Chain opportunities may be one of the best E-commerce opportunities for the Egyptian market in general. As the table below illustrates, there are many ways that improvements could be made for specific functions in the supply chain.

Function	Desired improvement
Inventory management	Cut inventory volume
Manufacturing management	Ensure that products are delivered on time in most efficient manner
	Cut manufacturing cycle times
	Increase revenues
Procurement	Reduction in costs of goods produced
Distribution management	Improved sales and delivery timeframes

Reasons for Supply Chain Management systems

Application Service Providers

One means to increase computer usage in Egypt would be to promote application rental for business and government computer users. Application rental eliminates the sometimes significant purchase cost for major computer applications and can even provide cost savings for everyday applications such as Microsoft Office.

Application rental is a new concept in the computer industry and relies on users having reliable, higher bandwidth connections to the Internet. The computers on a user's network use the Internet to connect to an Application Service Provider's computers where the rented applications are housed.

Twenty-five companies formed the Application Service Provider Industry Association (www.aspindustry.org) in May 1999. The following description is taken from their web site.

> An application service provider manages and delivers application capabilities to multiple entities from data centers across a wide area network. An ASP may be a commercial entity, providing a paid service to customers or, conversely, a not-for-profit or government organization supporting end users.
>
> The Application Service Provider (ASP) industry is a rapidly emerging segment of the computer industry. Many different kinds of companies are involved in the ASP industry, and these include computer software and hardware companies, network service providers, Internet service providers (ISPs), and ASP companies.
>
> An application service provider manages and delivers application capabilities to multiple entities from data centers across a wide area network.
>
> ASPs give customers a viable alternative to procuring and implementing complex systems themselves. In some cases, ASPs even provide customers with a

> comprehensive alternative to building and managing internal information technology operations. ASP customers also are able to control more precisely the total cost of technology ownership through scheduled payment schemes.

There is one direct and one indirect advantage to developing an ASP industry in Egypt. The direct benefit is to increase the use of more sophisticated application software in Egyptian industry by eliminating the high purchase price. Greater use of financial, inventory, data warehousing and other software should help make Egyptian businesses more efficient and more competitive in world markets.

The indirect benefit relates to perceptions of software value and regard for intellectual property in Egypt. Software vendors in Egypt face a very strong sales objection because many Egyptians ascribe little value to an intangible commodity like software. Systems vendors in Egypt routinely succeed in charging acceptable prices for hardware but are unable to do so for software. Further compounding the problem, because of the low regard for the value of software, many people freely copy software with no thought of intellectual property law violation.

A software rental strategy could be a major boost for software vendors because they will derive revenue from software rentals. In addition, consumers and business people will not be able to freely copy the rented software for use on other computers.

Reduced Cost Computers for Consumers

Various companies in the United States, the UK and other countries have begun to sell very low cost computers, in some cases actually giving the computers away. The business plan is usually to sell or give away the computer but:

- require the user to sign a one, two or three year contract for a service. This model is often used by ISPs who give away the computer in return for a long term monthly Internet access plan.
- force the user to view advertisements on the edge of the monitor whenever the computer is powered on.

Either of these strategies could help further the deployment of PCs to consumers and promote the use of the Internet. The first strategy practically guarantees the use of the Internet because access is bundled with the PC.

Web Content

A large part of stimulating demand for Internet use by organizations and individuals is providing attractive and useful places for them to go. Connectivity without content is obviously of little value. In this report, however, we have chosen not to address content development, largely because there are already many excellent sources of web content in Egypt as a result of both government and private sector initiatives, along with new programs like RITSEC's Global Campus (www.globalcampus.com.eg).

A related issued, also not addressed in this report, is the availability of content in Arabic for the majority of Egyptians who are not fluent in English.

Technology Overview

Common Acronyms and Abbreviations

For the reader's convenience, we are providing the following list of commonly used networking acronyms and abbreviations:

ADSL   Asymmetric Digital Subscriber Line

bps   bits per second

BRI   Basic Rate Interface (for ISDN)

CBR   Committed Burst Rate (for frame relay networks)

CIR   Committed Information Rate (for frame relay networks)

CO   central office (location of telephone company switching equipment)

Coax   Coaxial cable commonly used in cable TV systems and older LANs

DS-3   See T-3

DSL   Digital Subscriber Line

E-1   Name used in the US for European T-1 circuits operating at 2.048 Mbps

E-3   Name used in the US for European T-3 circuits operating at 139.264 Mbps

FT-1   Fractional T-1 circuit

Gbps   gigabits (billions of bits) per second

HDSL   High bit rate Digital Subscriber Line

HFC   Hybrid Fiber Coax

ISDN   Integrated Services Digital Network

ISP   Internet Service Provider

ITU   International Telecommunication Union

ITU-T   International Telecommunication Union – Telecommunication Standardization Sector

Kbps   kilobits (thousands of bits) per second

Mbps   megabits (millions of bits) per second

PRI   Primary Rate Interface (for ISDN)

T-1   Digital circuit operating at 1.544 Mbps in North America and Japan, and at 2.048 Mbps in most of the rest of the world.

T-3   Digital circuit operating at 44.736 Mbps in North America and Japan, and at 139.264 Mbps in most of the rest of the world; more properly known as a DS-3 circuit

telco   telephone company

VDSL   Very high bit rate Digital Subscriber Line

xDSL   Shorthand notation for various types of Digital Subscriber Line technology

Switched Telephone Services

56K Modems

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
up to 52,000 bps	up to 33,600 bps	unlimited	Yes	No

Modems capable of operating at up to 56,000 bps over ordinary copper telephone lines employ the technology of ITU-T recommendation V.90, which was adopted in September 1998. Such modems are widely available and are already in use in some places in Egypt. The key limiting factor for use of 56K technology, however, is that one end of the dialup connection must be a digital circuit. Typically, the consumer or business dialup customer uses a conventional analog line and dials into an ISP or corporate location that has either an ISDN PRI or T-1 circuit as shown in the picture below.

Anatomy of a 56K Connection
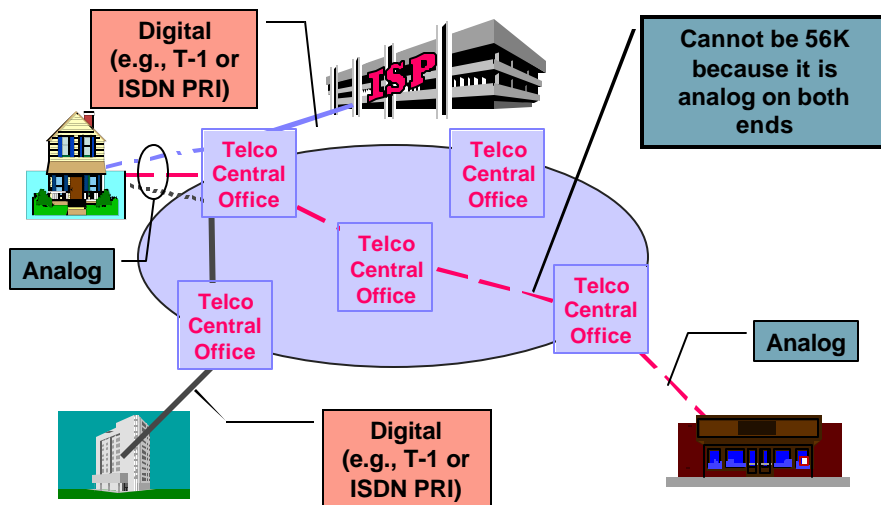
© 1999 Harvard Computing Group, Inc.

In addition to requiring a digital circuit on one end of a 56K connection, it is also important to realize that a 56K modem connection is asymmetric – the upload speed is restricted to conventional analog modem speeds of either 28,800 or 33,400 bps (as specified by ITU-T standard V.34bis). It is only the download speed that has the potential to reach 56,000 bps as shown in the diagram below.

56K Modems

To Internet or corporate data center

33.6K / 28.8K

56K

From Internet or corporate data center
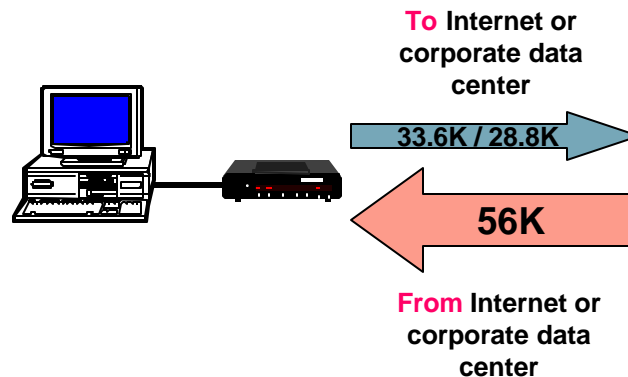
© 1999 Harvard Computing Group, Inc.

In many countries even the top speed of 56,000 bps is illusory, because the power required to transmit above 52,000 bps is greater than the transmit power allowed by the telephony regulatory body (e.g., the Federal Communications Commission (FCC) in the United States and the Canadian Radio-television and Telecommunications Commission (CRTC) in Canada).

Further compounding the problem, 56K technology is very dependent on the quality of the dialed circuit each time a modem completes a connection. In the United States, connections in the 42-46,000 bps range are very common, while connections as fast as 50,000 bps are quite unusual.

The primary advantage of 56K modem technology is that it can be deployed with little or no infrastructure changes by Telecom Egypt, assuming existing copper circuits will support speeds approaching 50 Kbps. The most significant expense is on the part of the ISP or corporate data center that wishes to offer 56K dialup connections and must first install a T-1 or ISDN PRI circuit and the supporting hardware.

The greatest uncertainty about 56K technology is knowing what maximum speed the copper phone lines in Egypt will support. The maximum speed will vary by location, and even by time of day in any one location, depending on the telephone company central offices through which calls pass, and on the specific copper circuits over which a given call is completed.

It is quite likely that some locations will find 56K to be advantageous while others see no advantage at all.

Switched 56

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
56,000 bps		unlimited	Yes	No

Switched 56 service is a telco digital service offering that delivers true 56 Kbps bandwidth in both directions. Both ends of the circuit must be provisioned for this service, so an ISP and a software company, for example, must both have the correct equipment in place.

The high-quality digital bandwidth of Switched 56 is available on demand, so users only pay for the service while it is actually in use.

If Switched 56 service is not widely available in Egypt today, it probably makes more sense for Telecom Egypt to invest in other higher bandwidth alternatives than to deploy Switched 56 service to its customers.

ISDN

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
BRI: 128,000 bps PRI: 2 Mbps		unlimited	Yes	No

ISDN technology uses existing copper telephone circuits but requires different equipment in both the telco central office and on the customer premises. An ISDN Basic Rate Interface (BRI) provides two B-channels, each of which operates at 64 Kbps. The B channels can be used independently for either voice or data, or can be connected together by software to provide a single 128 Kbps connection. An ISDN Primary Rate Interface (PRI) provides either 23 64 Kbps B channels (North America and Japan) or 31 B channels (in most of the rest of the world).

ISDN is primarily a dialup technology, though dedicated ("always on") ISDN circuits are possible. Call completion times range from two seconds to less than one second, in contrast with conventional analog lines on which dialing and modem handshaking typically take 15-30 seconds before data transmission can begin. Once an ISDN call is connected, many telcos charge a per-minute usage fee in addition to the monthly service charge.

The quick connect feature makes ISDN ideal for frequent, short calls for such Internet-related activities as checking email, transferring files or browsing the web. However, if Telecom Egypt charges a per-minute fee for ISDN, this service is less well suited for continuous access over long periods of time.

If the facilities are not already in place, ISDN would require substantial investment by Telecom Egypt to equip COs serving software parks or individual software companies with ISDN hardware and software. In addition, the ability to offer ISDN in any given telephone exchange is dependent on the quality and length of the existing copper lines; it is not a given that ISDN can be provided over all *in situ* copper circuits. On good quality copper, the maximum distance for ISDN is approximately 5500 meters from CO to subscriber premises.

Equipment charges for users are greater than for analog modems are not prohibitive.

Dedicated Services

T-1/E-1

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
1.5 Mbps (North America/Japan) 2.0 Mbps (elsewhere)		unlimited	Yes	Yes

T-1 circuits are the digital backbone of data networks worldwide. Lower and higher speed digital circuits are also common but the T-1 pipe is a fundamental building block. T-1 bandwidth in North America and Japan is 1.544 Mbps but consists of 2.048 Mbps in most of the rest of the world. E-1 is the designation used in the US to refer to the 2 Mbps variant to differentiate it from the 1.5 Mbps format (the E is E-1 stands for European).

T-1 bandwidth can be delivered on copper or fiber circuits and is provided in either channelized or non-channelized format.

- Channelized T-1 provides either 24 (US/Japan) or 32 (elsewhere) 64,000 bps circuits. Each circuit can be used at the full rate or can be further subdivided by customer premises multiplexers.
- The non-channelized format delivers the full 1.5/2.0 Mbps bandwidth to the user and requires that the user provide bandwidth management equipment at the ends of the circuit.

Equipment is widely available to deliver a portion of a T-1 circuit, known as a Fractional T-1 (FT-1), in cases where a user does not require the full T-1 bandwidth. FT-1 bandwidth is usually available in quantities such as 256, 384, 768 and 1024 Kbps (North America and Japan).

Deploying additional T-1 circuits in Egypt should be relatively simple as both the telco and subscriber equipment is readily available in the market. The quality of installed copper and the waiting time to have new copper lines installed are potentially significant problems, however. One drawback to T-1 circuits is that they are a point-to-point, wire-based technology – each T-1 circuit is a separate entity, so connecting 50 locations requires 50 separate circuits.

Depending on the locations of a software park or software company and its ISP, it is physically possible to bypass Telecom Egypt and implement T-1 service by laying fiber or copper circuits directly between the two parties (regulatory issues notwithstanding). If a subscriber and its ISP are close to each other and they can secure the rights of way to lay cable, this could be an inexpensive way to provide high-bandwidth at a fixed cost. Note that one drawback of an arrangement like this is that the subscriber loses flexibility; it may be prohibitively expensive to change to a different ISP because the fixed circuit cannot be moved. Further, if the circuit goes down or is physically damaged, the two parties on the ends of the wire must effect repair because Telecom Egypt is not involved.

T-3/E-3

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
45 Mbps (North America/Japan) 34 Mbps (elsewhere)		unlimited	Yes	Yes

T-3/E-3 circuits are the next important step up in the digital transmission hierarchy. A North American T-3 circuit is equivalent to 28 T-1 circuits and is available either channelized or non-channelized. The E-3 format includes 16 E-1s.

The primary difference between T-1 and T-3 is that T-3/E-3 circuits generally require fiber optic cabling instead of copper telephone wire, consequently, these higher bandwidth circuits cannot be deployed casually over existing copper.

SONET/SDH and Optical Carrier

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
OC-3: 155 Mbps OC-12: 622 Mbps OC-48: 2.4 Gbps OC-192: 10 Gbps		unlimited	Yes, but not in the foreseeable future	Yes

The optical carrier hierarchy identifies bandwidth bundles that can be carried over fiber optic cabling. Much of the backbone of the Internet, i.e., the ultra-high-speed circuits at the center of the Net, operate at OC-12 and above. New US telecommunications companies such as Qwest have deployed fiber networks running at OC-192 speeds. In the United States and some other parts of the world, it is increasingly common for large multi-national firms to lease fiber circuits operating at optical carrier speeds to satisfy their ever-increasing demands for bandwidth.

It is unlikely that any software company in Egypt would need anything approaching OC-3 speeds in the foreseeable future. As the demand for Internet connections in Egypt grows over the next five years, however, it is quite likely that Egypt's connections to the Internet backbone will move to optical carrier speeds.

Cable Modems

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
one-way modem			Yes	No
1.5 to 10 Mbps	33,600 bps			
two-way modem			Yes	No
1.5 to 10 Mbps	300 Kbps			

Cable Modems transmit over the coaxial cable commonly used to deliver cable television signals to homes. Cable systems have traditionally been used for simplex (one-way) transmission and many older systems cannot support full duplex (two-way) transmission without significant infrastructure upgrades.

It is possible to avoid massive upgrades and still provide Internet access on older cable systems by employing one-way modems on the coax cable for the downlink, but requiring a telephone line and modem for the uplink. While this does allow a cable operator to provide Internet access service, it is certainly not as effective as the full duplex modems described in the next paragraph. For one thing, the user must dial the uplink connection before using the service, so it is not a dedicated facility.

Cable systems deployed in the last decade often have been planned with full duplex transmission in mind, so the capital costs to implement two-way service are considerably lower. The newer systems are referred to as HFC (hybrid fiber coax) because they usually incorporate fiber optic cabling for increased bandwidth and reliability from the head end (central location at the cable company) to neighborhood distribution points. The links from the distribution points to homes and businesses consist of coaxial cable. Just as television signals are always arriving at a home, on a two-way system, Internet service is always on.

There are two problems inherent in cable modem services, both of which result because the cable network becomes, in effect, a neighborhood LAN.

1. **There is a potential security risk:** it is quite possible for someone to observe traffic from other computers in the neighborhood or to browse the hard drive of other computers on the cable. Most cable companies implement software that only allows certain types of traffic on the network, however, some risk is still present. Users can install additional security software on their premises to further mitigate the risk.

2. **Bandwidth is shared:** the more people in a given neighborhood that sign up for and use the cable Internet service, the slower the response becomes for everyone. To combat this problem most cable operators over-engineer their networks and continually monitor traffic levels in each neighborhood. If traffic increases past a predetermined threshold, the operator will subdivide the network to improve performance.

Whether they use one-way or two-way modems, cable-based Internet services are asymmetric, that is, they provide considerably greater speed on the downlink than the uplink direction. They work extremely well for web browsing and email and are well suited for home or small business use if email and the web comprise the primary usage.

Cable modems are not likely to be suitable for use, however, by a software company that frequently ships large files in the outbound direction (this is especially true when the uplink is a telephone line for a one-way cable system). Highly symmetric applications like video conferencing will not function well on cable networks either.

Digital Subscriber Line (DSL)

The term DSL applies to a family of technologies with quite varied requirements and capabilities, but they share one very important common feature – they all run over ordinary copper telephone wires. Most varieties of DSL are designed to operate in addition to conventional analog phone service, on the same copper wire pair, without interference.

However, despite the general similarities of the DSL technologies, individual types of DSL vary considerably in speed, distance and tolerance of lower quality copper circuits. The latter point regarding copper quality is extremely important as all DSL services are intolerant (to varying degrees) of low quality circuits. To complicate matters even more, not all variations of even the same type of DSL are compatible. There are, for example, multiple, incompatible types of HDSL and ADSL (both of which are defined below). The incompatibilities can make implementing DSL extremely tricky for a telephone company. It may not be possible for two different forms of DSL coexist in the same wire bundle within the telephone network.

The acronym xDSL is frequently used to refer generically to the various types of DSL. xDSL, includes, ADSL, IDSL, HDSL and others. In this report, we will concentrate on three xDSL varieties that are most likely to be useful in Egypt in the next five years.

DSL requires special equipment in telco COs to separate conventional voice signals from the DSL signals. Most DSL varieties also require a "splitter" at the customer end of the circuit, however, there is one variety that does not – see G.Lite below.

ADSL

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
from 128 Kbps to 8 Mbps	from 64 Kbps to 768 Kbps	up to 5500 meters	Yes	No

Asymmetric Digital Subscriber Line (ADSL) is frequently promoted as the ideal form of DSL for consumer and small business Internet access. The word asymmetric in the name suggests that the use of the circuit is not balanced. Indeed, the typical ADSL line offers three to ten times as much bandwidth from the network to the subscriber as in the other direction. Many Internet applications are asymmetric by nature, so ADSL may be a good fit. Web browsing in particular typically involves sending small amounts of information out, e.g. http://www.harvardcomputing.com, and receiving a large quantity of information back in the form of a page full of text and graphics.

Typical downstream/upstream combinations for ADSL include:

- 384 Kbps/128 Kbps
- 768 Kbps/384 Kbps
- 1500 Kbps/384 Kbps

- 6100 Kbps/640 Kbps
- 8200 Kbps/768 Kbps

Maximum speeds for ADSL are heavily dependent on the length of the connection from the subscriber to the CO. As an example, the maximum possible speed drops by a factor of six when the CO-to-subscriber distance is doubled.

A significant advantage of ADSL is that it is "always on," that is, the circuit is always connected. Every request to send information happens immediately because there is no dialing delay.

ADSL is typically deployed as shown in the diagram below.
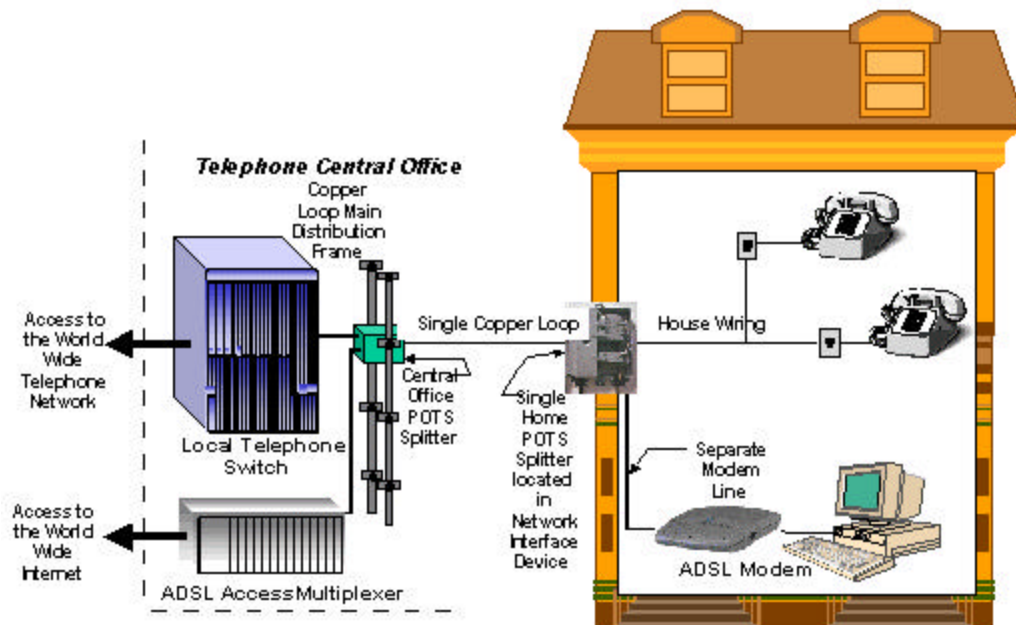
ADSL with Single Splitter figure 1

Source: Page 2 of the G.Lite white paper from Orckit Communications Ltd. at
http://www.orckit.com/glite.html

While ADSL is an "always on" service, one US phone company, USWest, introduced an on-demand version of ADSL in September 1999. Once the user connects, the service remains connected for as long as two hours, and once disconnected, the user can reconnect after five minutes. Users do face the prospect of not being able to connect during busy periods, in effect receiving an engaged signal, but are free to try again at any time. USWest charges 30% less per month for on-demand ADSL than for conventional ADSL.
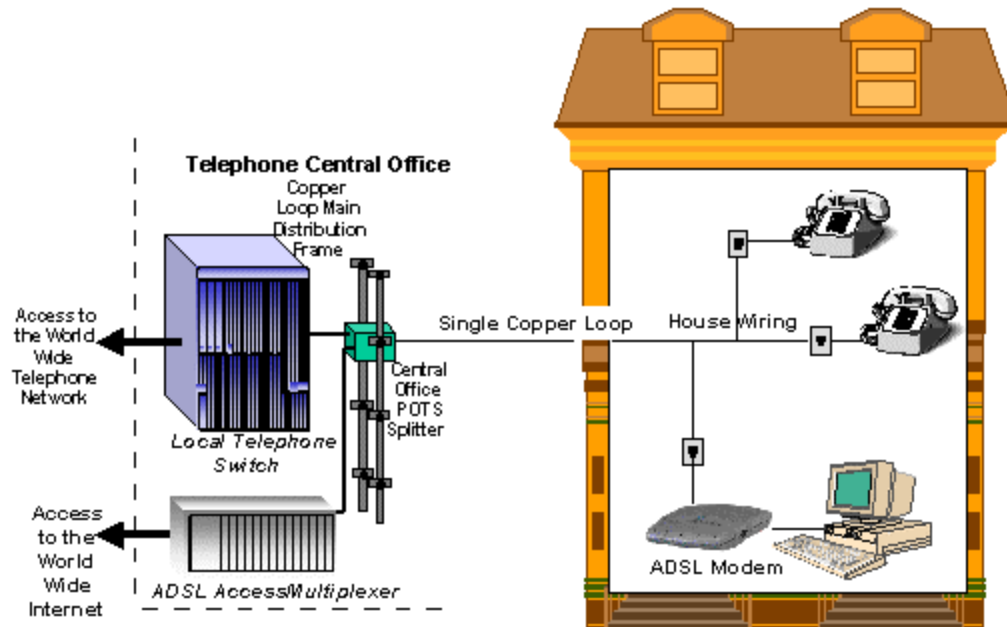
G.Lite

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
from 128 Kbps to 6 Mbps	from 64,000 bps to 768 Kbps	up to 5500 meters	Yes	No

G.Lite, also known as Universal ADSL, operates at a lower maximum speed than ADSL but has the considerable advantage of not requiring installation of a hardware splitter at the customer premises. Consequently, the service provider can turn a new customer on from the central office without requiring a site visit.

ITU-T adopted a recommendation for G.Lite in mid-1999 called G.992.2.

In contrast to the ADSL picture above, G.Lite is installed as shown below.

Source: Page 3 of the G.Lite white paper from Orckit Communications Ltd. at
http://www.orckit.com/glite.html

HDSL

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
1.5 Mbps (North America/Japan) 2 Mbps (elsewhere)		up to 3600 meters	Yes	Yes

High bit rate Digital Subscriber Line (HDSL) is a symmetric link, offering equal bandwidth in both directions, and is appropriate when communication requirements are more balanced or when outbound transmissions exceed inbound. Applications that are good candidates for HDSL include video conferencing, high volume outbound file transfers and web server hosting. Because the latter two are common activities for software companies, HDSL is likely to be more important for some installations than ADSL.

HDSL is the most widely deployed xDSL technology because it was the first to be developed as telephone companies sought alternative technologies for providing T-1 speed circuits.

VDSL

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
up to 52 Mbps	up to 6 Mbps	up to 1500 meters	Yes	Yes
1.5 Mbps (North America/Japan) 2.0 Mbps (elsewhere)		up to 1500 meters	Yes	Yes

Very high bit rate Digital Subscriber Line (VDSL) operates at extremely high speeds, up to 52 Mbps/6 Mbps asymmetric or 13 Mbps symmetric, over relatively short distances. It is typically used in conjunction with telco deployment of fiber circuits that come reasonably close to the customer premises. Typically the telco deploys fiber to the curb, building basement or a neighborhood junction point, and uses VDSL for the last few meters to the customer.

Although VDSL equipment is available from numerous vendors, it is not widely deployed, primarily because of the copper distance limitation and resulting fiber deployment requirement.

In Egypt, VDSL is most likely to be cost effective for software parks rather than individual companies because of the infrastructure investment. It could be a very attractive alternative for software parks in lieu of running fiber the entire distance to the park.

Etherloop

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
125 Kbps to 10 Mbps		6400 meters	Yes	No

EtherLoop, from Elastic Networks (a subsidiary of Nortel Networks) is the newest technology reviewed in this document and offers several very interesting characteristics that could make it extremely attractive in Egypt.

EtherLoop implements Ethernet-like LAN service on ordinary local loop copper telephone lines without interfering with existing telephone service. In this regard, it sounds like DSL but its inventors claim it is much less intrusive than DSL because, among other reasons, it uses lower-powered signals that do not interfere with analog telephone or even xDSL signals that might be in the same wire bundle.

EtherLoop allows deployment of LAN-like connectivity through the telephone network, which would be of significant value for connecting a software company to an ISP. Much of the focus for Elastic Networks and their current distribution partners is on hotels, apartments, condominiums and small office parks, in which there are multiple computers that need to connect to the Internet. New Egyptian software parks clearly fit quite nicely into this scenario.

Wireless Services

Wireless services are extremely attractive in areas with an insufficient, poor quality or non-existent installed base of copper and fiber circuits. While there are fiber and copper telco circuits throughout Egypt, many are not capable of supporting the higher speeds required

for a software company to be a world-class competitor. Wireless technologies could be an excellent means to bridge that gap.

Many wireless products are hampered by topography and weather though that should not be a problem in Cairo. The geography and climate of Cairo present an exceptional opportunity for the use of wireless services:

- The terrain of the city and surrounding area is reasonably flat and free of obstructions (other than buildings) that would block line-of-sight signals.
- There are higher elevations on the outskirts of Cairo from which line-of-sight or broadcast services could reach many buildings in and around the city.
- Signal quality will not be affected by weather, as is common in many other parts of the world, because of Cairo's low humidity and absence of rain, snow or fog.

Other cities in Egypt that share Cairo's terrain and climate features are equally well suited for wireless services. Wireless can also be an excellent means to provide new or enhanced voice and data service in sparsely populated regions where the cost of stringing cable can be prohibitive.

Wireless technologies fall into two broad categories, broadcast and point-to-point. Broadcast technologies, like ordinary radio and television, can be received by anyone with the appropriate equipment who is within the broadcast area. Point-to-point technologies require fairly precise equipment setup to align the transmitter/receivers on each end of the circuit. Once that has been done, however, they are not only effective but also quite secure because there can be only one receiver in the line of sight.

It is the later property that has caused the Egyptian government to prohibit, or at least place severe restrictions, on wireless technologies in order to prevent their use for clandestine activities. If this policy is still true, it will severely limit the application of a highly desirable technology for enhancing Internet bandwidth.

Microwave

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
1.5 or 2.0 Mbps to 45 Mbps		30-50 km (without repeaters)	Yes	Yes

Microwave is a line-of-sight transmission medium using radio frequency signals. It is a point-to-point, not broadcast, medium so each company or software park requires its own microwave link. However, this feature also provides good security as it is only possible to intercept a microwave signal if you are in the direct path between the transmitter and receiver.

Microwave links have been part of the world's public telephone networks for decades and have been used to build private point-to-point links as well. Given the positive attributes of the landscape in Egypt, especially around Cairo, microwave connections to/from software parks are a very logical alternative. The capital costs for antennae installation may be too high for individual, small companies but should be affordable for medium to large companies.

One drawback of some microwave systems is that they utilize licensed radio frequencies so that each installation is subject to a licensing and approval process.

Satellite

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
400 Kbps	33,600 bps	unlimited	Yes	No

Most satellite communications employ satellites in geosynchronous equatorial orbits, that is, the satellite's orbit over the equator is timed to coincide with the rotation of the earth. This type of orbit causes the satellite to appear stationary from the ground, which eliminates the need to relocate or change the aim of earth-based antenna.

There are two significant advantages of satellite links:

- Satellites provide a broadcast medium. Any antenna that can "see" the satellite (i.e., the satellite is above the local horizon) and can tune to the correct frequency can send and receive via the satellite.

- Satellite links can be used in remote or hard to access locations without the need to secure rights-of-way on the ground or to lay cables.

There are two compensating disadvantages of satellite transmission:

- Satellite broadcast can be received by any antenna that can see the satellite, which presents a potential security risk (encryption can ameliorate the risk significantly).

- Because geosynchronous satellites are approximately 22,300 miles above the earth, the round trip delay for transmissions is up to one-half second. The delay can cause timing problems with certain data transmissions and can be annoying to humans waiting for transmissions to complete.

The delays inherent in satellite transmission make it unsuitable for highly interactive applications such as web browsing or online chat, but are less noticeable for one-way applications like file transfer. Some ISPs in Egypt have been using Zaknet to download files via satellite and there is some more recent corporate use as well.

The technique used by most Internet-via-satellite services to hide some of the inherent delay is to use the satellite in the downlink direction only. In the uplink direction, they employ an ordinary dialup telephone line, which accounts for the highly asymmetric transmission rates in the table above.

The next several years may change the dynamics of satellite transmission radically. For example, Nortel Networks has announced plans to deploy a satellite network in Europe in late 1999 that will offer downlink/uplink speed combinations such as the following:

- 38 Mbps/160 Kbps   (target market: small office/home office)
- 38 Mbps/384 Kbps   (target market: small and medium businesses)
- 38 Mbps/2 Mbps   (target market: medium and large businesses)

Laser/Optical

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
1.5 or 2.0 Mbps up to 45 Mbps		7-10 km	Yes	No
622 Mbps		2.5 km	Yes	No

Optical point-to-point services operate in a similar fashion to microwave links but use laser light beams instead of radio waves. Like point-to-point microwave, these links require small transmitter/receivers that can be mounted on top of a building or even in a window. Optical links could be very effective between certain locations in Cairo and elsewhere in Egypt and are well suited for User-to-ISP connections. Optical links from an ISP to the Internet are less practical because of the distance limitations.

A further advantage of optical transmission is that it does not use or interfere with licensed radio frequency spectrum so it does not require government approval in most countries.

Packet Radio

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
56 – 170 Kbps			Yes	No

Packet radio services utilize the GSM cellular network for data transmission. Unlike current cellular modems that tie up an entire channel and are limited to approximately 9600 bps, packet radio makes dramatically more efficient use of cellular channels through the use of packet switching, achieving much higher throughput.

GSM packet services are in very early deployment stages but should become more widely available over the next two years. It is unlikely that a software company would rely on packet radio as its primary Internet connection, however, these services would make it very simple for a software company to incorporate high speed Internet access into product demonstrations or training classes in any location. There would be no need to worry about whether a particular prospect/customer location or seminar facility had Internet connections of sufficient bandwidth – the software company would merely bring its Internet connection with it in a laptop.

Data Network Services

Frame Relay

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
up to 1.5/2.0 Mbps		unlimited	Yes	No

Frame relay networks provide very efficient use of network bandwidth through packet switching, and provide customers with up to T-1/E-1 access speeds to the network. Frame relay networks give customers the option to choose a minimum amount of bandwidth they will always want, known as the Committed Information Rate (CIR). In addition, customers can select two levels of burstable bandwidth to handle excess demand when required. The

network provider does not guarantee that the burst bandwidth will always be available, but it usually will be.

Customers pay a flat monthly fee plus additional charges based on actual usage, which typically makes the service much more affordable than installing fixed cost, high-bandwidth circuits that may be underutilized for much of a month. To restate the value proposition to the user, instead of paying "per mile per month" for bandwidth they may only need occasionally, frame relay offers "elastic" bandwidth and fees based primarily on usage.

Frame relay may not be more cost effective for user-to-ISP connections over shorter distances such as those in and around Cairo, especially for a single user location. In Cairo, a dedicated circuit, either wired or wireless, may be a better alternative. Frame relay tends to be very appropriate when an organization has multiple locations to interconnect with each other and to the Internet.

It is possible that a single frame relay network could be an effective way to connect software companies, software parks and ISPs together. Each location only needs a single connection to the frame relay network and inherits the ability to connect to any of the other organizations connected to the network. This arrangement would make it extremely easy for a software company (or software park) to change ISPs, for example. They would not need to install a different communications circuit but merely reprogram their software to connect to a different party.

Asynchronous Transfer Mode

Downlink Speed	Uplink Speed	Max. Distance	User to ISP	ISP to Internet
25 Mbps or greater		unlimited	Yes	Yes

Asynchronous Transfer Mode (ATM) technology is a form of cell switching in which data is broken into small, fixed-size units called cells. Cells are routed or switched through a network at sufficiently high speeds that ATM can provide the equivalent of both leased and switched services. ATM can deliver constant rate bit streams (very important for time sensitive data like voice or video) and is, therefore, one technology on top of which it is possible to provide almost any type of data, voice or video service.

ATM also scales extremely well from relatively low speed LAN-style links at 25 Mbps up to optical carrier speeds, consequently if can be used in local or wide area networks. It is not commonly used on LANs, however, as there are ever-faster and less expensive variations of Ethernet that provide better cost efficiencies. In the medium and long distance, though, ATM is a growing factor in the world's telecommunications networks.

ATM could be used to construct a Cairo-area metropolitan network for all subscribers to connect to their ISPs and could also be used to connect ISP to each other and to the Internet. An ATM network could easily be extended from Cairo to other parts of Egypt as well.

Short term/long term

Determining the next stages of this complex issue is a very important decision making

process. We recommend that the next stages would be to commission a study of these alternatives involving the government and other groups identified earlier in this section.

We also believe that an independent consulting group, should be tasked with evaluating these options in detail and then making recommendations to the government and telecommunications groups accordingly. Although this study would like cost more than ones conducted by individual vendors or suppliers who may be able to provide these services to Egypt, we believe that a more balanced and objective view would be taken separately from the providers.

Dependent on the level of detail required, we estimate that this study could cost somewhere from $1M to $3M USD.

Domestic Growth

Recommendations

While the expansion of the software industry by stimulating domestic growth remained a medium level priority in the development of the plan, implementing some of these options could make some significant improvements.

During the development of the framework for this plan, individual groups recommended several options, and consensus was met on the following initiatives.

Promotion of computer usage in government and among Egyptian society

This will assist in the development of demand and awareness of the important aspect of using computers in society today. Making this experience a part of everyday life will increase the domestic demand and potential for staffing in the computing and related industry.

Limit government department's ability to compete with private sector (internal IT and software centers)

There is considerable concern among current members of the Egyptian Software Association and private firms in general that it is very difficult for the commercial software industry to compete with internal programs operating within various department in the Egyptian government. In particular the activities in the ministry of Education, where there is potential for significant demand for computer based learning and Internet distance learning programs.

Legislation that would limit the government's power to create competitive software development shops to the commercial would stimulate demand in the private sector.

Create momentum in government agencies and contracts to use computers to the fullest extent possible

Development of programs that could be created in conjunction with the Export Software Organization to produce an Egyptian e-government program would be a very healthy process. Government around the globe are trying to find more efficient and effective ways of distributing information and doing their work. The US e-government program is a good example of a program such as this. Several areas could assist dramatically in the development of these goals including:

1. Require governmental communications and proposals to be submitted electronically

2. Set IT goals for government agencies (including external projects).

3. Set IT goals for entities involved in the privatization process and assure computerization is in the business plans.

4. Promote computer training/usage in schools and libraries.

5. Promote computer usage through speeches and overall government promotions.

6. Establish a software promotion agency to use all available means to promote computers and software both domestically and in export trade.

7. Encourage re-engineering initiatives.

Tax breaks and incentives

Establishing goals for businesses to use IT and reward business so that they meet specific criteria with tax breaks could have a very positive impact on the use of software in the country. These tax breaks could include the development of programs to allow and encourage the use of technology in business operations. These could be incentives for particular industries that there is a desire to increase export or efficiency of their operations. They would allow for the improvement of other programs and export industries, particularly in the manufacturing sector, which appears to have exploited the use of computers on a very limited basis.

Another area of opportunity to improve domestic growth would be through the addition of a broader "tax holiday" structure. This would also encourage firms to that had achieved a certain level of profit or growth to reach entitlement levels for a "tax holiday" or break to occur.

It is also recommended that existing firms be grandfathered into the program automatically, thereby eliminating the need for applications and other corporate structure change to qualify under the current program.

Development of a tax break program for multi-national firms in the software industry will allow firms currently excluded from certain domestic business opportunities to participate in some of the programs.

Promote computer usage in government and among Egyptian society to make computers an integral part of every day Egyptian experience.

- **Limit government department's ability to compete with private sector (internal IT and software centers).**

- **Create momentum in government agencies and contracts to use computers to the fullest extent possible.**

- **Require governmental communications and proposals to be submitted electronically.**

- **Set IT goals for government agencies (including external projects).**

- **Set IT goals for entities involved in the privatization process and assure computerization is in the business plans.**

- **Promote computer training/usage in schools and libraries.**

- **Promote computer usage through speeches and overall government promotions.**

- **Establish a software promotion agency to use all available means to promote computers and software both domestically and in export trade.**

- **Encourage re-engineering initiatives.**

Establish goals for businesses to use IT and reward business so that they meet specific criteria with tax breaks.

Highlights of promotion programs for domestic growth incentives

There has also been some suggestion of subsidized salary levels of entry level staff during their first year of operation.

Next stages

It is recommended that a start-up conference on this topic be led by the responsible government ministry in conjunction with the Export Software Organization. The Export Software Organization will ensure that other parties that need to be involved in the program are invited as appropriate. If these initiatives were successful because of the conference, it would make sense to form a working group specifically for this topic.

Regulatory Reform

General

The change process requires, not only a knowledge of the issues and options for legislative and regulatory change, but also an organizational structure for careful processing, coordination, consensus building, and delivery of change.

For this reason we have adopted the structure of a quasi-governmental organization where each of the interested parties from government, industry, education and banking sectors can participate where appropriate in the process. Funding for the activity is provided by government and the group is accountable for the end result - specific and detailed recommendations to government that have the support of the interested and affected parties. Execution of the regulatory change remains the responsibility of the authorized government agency and they have been an active participant in creating the reform.

This model is a combination of the approaches used in India and Israel. India uses an industry driven approach (NASSCOM), and Israel (Office of Chief Scientist) a more closely government controlled process.

The proposed Export Software Organization (ESO) has an integral division, the Regulatory Reform Working Group (RRWG), who has the responsibility of coordinating regulatory reform through several working committees. These can be added to or disbanded as tasks are completed or needs change. A ESO staff member recruited for his maturity, experience in the subject area, and facilitation skills chairs each of these committees. These chairpersons report to the Chairman of the RRWG for the coordination and synchronization of the various elements of the reform package.
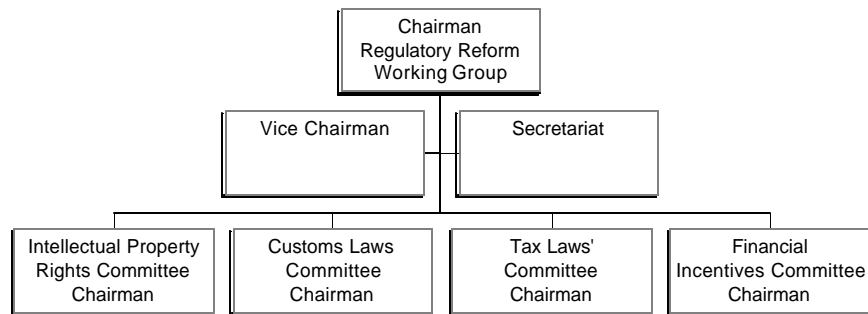
A key element to these working groups is that they represent the interested parties and can be held accountable for the deliberations, timetable, and passage of the reform. The RRWG should be able to invite consultation from experts in the field as and when required for research and advice.

The Regulatory Reform Working Group

Role

The role of the RRWG is to consider all regulation matters that effect the Egyptian software industry; research the issues, and develop recommendations to government for policy, and regulation introduction or change.

The group consists of a Chairman, Vice chairman and a secretariat who supports the activities of the RRWG and its committees. The Chairman, an employee of the ESO, reports to the Director.

```
                    ┌─────────────────┐
                    │    Chairman     │
                    │ Regulatory Reform│
                    │  Working Group  │
                    └─────────────────┘
            ┌─────────────────┐  ┌─────────────────┐
            │  Vice Chairman  │  │   Secretariat   │
            │                 │  │                 │
            └─────────────────┘  └─────────────────┘
  ┌──────────────┬──────────────┬──────────────┬──────────────┐
┌──────────────┐┌──────────────┐┌──────────────┐┌──────────────┐
│Intellectual  ││Customs Laws  ││ Tax Laws'    ││  Financial   │
│Property      ││Committee     ││ Committee    ││Incentives    │
│Rights Committee││Chairman    ││ Chairman     ││Committee     │
│Chairman      ││              ││              ││Chairman      │
└──────────────┘└──────────────┘└──────────────┘└──────────────┘
```

The role of the chairman is to:

- Lead the RRWG and be the ESO spokesperson on regulatory reform
- Plan and execute the reform agenda in accordance with policy directives and budgetary constraints
- Coordinate the activities of the committees to ensure that consistent and timely recommendations are generated and passed to government for action.
- Monitor and coordinate and the progress of recommendations with other government bodies

The following committees are constituted within the RRWG:

- Intellectual Property Rights Committee
- Customs Laws Committee
- Taxation Laws Committee
- Finance and Banking Committee

The staffing of the RRWG is expected to be around 8 full time employees - 5 chairpersons and 3 secretariat, and approximately 25 participants from representative interests.

It is envisaged that each of the committees will initially convene at a 2 to 3 day session to define the strategy, plan, and agenda for the group and then on the basis of 2/3 hours per week as work progresses, for review, discussion and decision.

The following sections outline the roles, members and potential actions for each of these committees.

Intellectual Property Rights

Intellectual Property Rights Committee

Role

The IPRC has the responsibility to identify and formulate recommendations for regulatory changes and enforcement in intellectual property rights that affect the software industry. The committee consists of a chairman, who is a member of the Organization staff, and representatives from government, legal (Attorney General's Authority), the legal profession, and the software industry. The Egyptian World Intellectual Property Organization (WIPO) delegate should also be a member of the committee.

The chairman reports to the Chairman RRWG and is responsible to coordinate the committee, define its strategy, identify and prioritize the items for reform, and plan and execute an intellectual property reform agenda. The IPRC can also seek/appoint external consultants to research and advise the committee where necessary. The WIPO offer consultative services (see attached charter) to member nations and would be an excellent source of knowledge, networking, and support for the committee in the initial stages of the planning and execution.

Committee Structure

Chairman - ESO staff member

Secretary - RRWG secretariat

Representatives from:

- Government - Ministry of Culture and Information
- Legal - Egyptian legal (IP) profession (e.g. Shalkani Group or B&B)
- Ministry of Interior - enforcement issues
- Industry representative - software industry association executive
- Govt. regulations - Attorney General's Authority
- Treaty - Egyptian government WIPO delegate
- Expert - WIPO support services

Other decision support as necessary

Agenda

The introduction, regulation, and enforcement of intellectual property rights are a key issue for the software industry. Without this, foreign capital, software import and exports, local investment, and cooperative and aid programs will not succeed. There is an increasing awareness of this issue in World forums and most trading nations are monitored and reported on regularly.

A number of Egyptian intellectual property issues were identified in the Harvard report of 9 May with the following recommendations:

Bring Intellectual Property Rights to US and European Union standards for all computer hardware, component, peripheral and software products.

- Establish viable legal guidelines and policies for enforcing Intellectual Property Rights standards.
- Assure equal fair treatment of Egyptian and foreign companies in enforcing Intellectual Property Rights.
- Establish meaningful and enforceable penalty deterrents for abusers of Intellectual Property Rights. These penalties should deal with internal Egyptian abuse as well as abuse related to the international marketplace.
- Educate law enforcement authorities and jurists on the importance of Intellectual Property Rights enforcement.

Assure law enforcement and judicial systems act at an appropriate parallel level with the US and EU law enforcement and jurist community in enforcing Intellectual Property Rights.

Assure law enforcement and judicial systems enforce non-compete clauses and the Intellectual Property Rights of Egyptian employers.

- Educate attorneys/solicitors on the importance of Intellectual Property Rights enforcement and of enforcement changes in Egypt.
- Educate businesses and university educators on the importance of Intellectual Property Rights enforcement and of enforcement changes in Egypt.
- Educate businesses and university educators of the protection that Intellectual Property Right legislation to internal Egyptian Intellectual Property in addition to international Intellectual Property.
- Employment Contract laws need to be improved to ensure that IP inside firms is protected and enforced. Labor laws to protect firms' software processes.

A relatively new initiative in the European Union and WIPO forums has been directed at concerns over data base copyrights. As E-commerce, knowledge based systems and on-line transactions are growing quickly, the importance of the key data base technology and content is also. As these components accelerate in value so does the need to protect this property effectively.

Egypt is a member nation and an active participant to the three major international IP bodies; WIPO, Berne, and Paris. Further it has been progressive in passing regulations in accordance with WIPO recommendations; however it has not been successful in enforcing many of the safeguards. As such much of the initial reform agenda will need to focus on enforcement issues.

Regulatory Status

The following has been extracted from recent reports provided by the World Trade Organization on the issue of Intellectual Property, particularly as they relate to Egypt's status on certain issues.

> **Patents.** Despite significant government efforts to improve legal protection for copyrighted works and enforcement of the copyright law, Egypt has been behind in passing a modern patent law. Because of that, in May 1995, the U.S. Trade

Representative placed Egypt on the "Watch List". A new patent law is under consideration. The new law represents a significant improvement, and once implemented, is considered a model patent law for the developing world.

Trademarks. Egypt is a signatory of the Paris Convention for Protection of Industrial Property of 1883, the Madrid Convention of 1954, and the Nice Convention for the Classification of Goods and Services. Law 57 of 1939 provides trademark protection. The Trademark Law is not enforced strenuously and the courts have only limited experience in adjudicating infringement cases. Fines amount to less than $100 per seizure, not per infringement, although criminal penalties are theoretically available. The Ministry of Supply is introducing a new bill that consolidates Egypt's 1939 Trademark Law, the 1951 Trade Name Law, and the 1949 Industrial Design Law.

Copyrights. In response to calls for improved legal protection for copyrighted works, the government passed Law 38 of 1992, amending the 1954 Copyright Law. The Berne Convention, to which Egypt acceded in 1977, is self-executing according to Egypt's Constitution. Thus, international copyright holders may be able to rely directly on Berne Convention provisions in Egyptian courts in areas where the coverage of the Egyptian copyright law is vague or non-existent. In March 1994 the government amended provisions of Law 38 to ensure that computer software was afforded protection as a literary work (allowing it a 50-year term of protection). In addition, in April 1994 a ministerial decree clarified rental and public performance rights, protection for sound recordings, and the definition of personal use.

Copyright piracy is still widespread and affects all sections of ownership, however progress is being made in most areas except software. Most piracy seems to be for the local market, with some imports of pirated works from Lebanon and the Gulf States.

Trade Secrets. Egypt has no specific trade secrets legislation. Protection of commercially valuable information is possible through contractual agreement between parties. Breach of contractual terms of protection can be remedied in legislative proceedings under either the civil or criminal code, depending on the severity of the damage caused.

Factors

According to a European Commission report, the level of piracy in Egypt is estimated to be about 42% of the market for legitimate products.

Many companies have a positive view on some changes that have occurred to help with the support of the industry over the course of the past 12-18 months. In particular the new intellectual property laws have received praise from many industrialists. However, there is still a wide range of improvements that software executives need to improve security and grow their operations.

Egyptian firms in the study complained about labor laws that do not consider technology protection or intellectual property, fundamental to the protection of the asset of a software company. There is little or no way to stop someone essentially stealing the intellectual property of his or her previous employers company.

The Egyptian government has contributed to reducing the piracy rate in Egypt by passing anti-piracy legislation but enforcement is generally considered ineffective. Those responsible for enforcement have insufficient training and some of the measures they used have not had the desired affect; e.g., confiscating PCs without offering the owners the opportunity to correct the license violations first. The result of this action was cries of injustice and the culprit became the government rather than the perpetrator. The MD of one multinational firm claimed that the presence of Oracle and Microsoft in Egypt has actually accomplished more to improve awareness and reduce piracy than has government legislation. These companies have offered training to officials and developers to increase the awareness of IP issues. Several people commented, however, that Microsoft could do significantly more by offering very low-priced licenses to encourage existing violators to become "legal." To date, Microsoft has refused.

Another software company MD commented that the multinational firms could accomplish a lot more if they would offer dramatic reductions on the pricing of second and subsequent licenses for a given product. This MD felt that the outside software companies should recognize some level of piracy as fact in the Middle East, and price products in a way that removes most of the incentive to make illegal copies.

Software is not the only item that is frequently copied illegally. Many firms said that they know of cases in which other companies have copied not only their software, but their marketing materials, business card design, and even ISO 9000 certification seals.

Many people acknowledged that while piracy and IPR violations are a big problem in Egypt, they are far worse in many other Gulf countries."

The overseas examples shown below illustrate India's commitment to not just pass conforming legislation but also to rigorously enforce IP laws. When combined with education programs to provide better understanding of the benefits of IP rules, national attitudes and practices will gradually change. Pakistan faces similar or worse issues to those of Egypt.

The Indian Experience

In India, the Intellectual Property Rights (IPR) of computer software are covered under the Copyright Law. Accordingly, the copyright of computer Software is protected under the provisions of Indian Copyright Act 1957. Major changes to Indian Copyright Law were introduced in 1994. These changes came into effect from 10 May 1995. This has made the Indian Copyright law, one of the toughest in the world. The amendments to the Copyright Act introduced in June 1994 were a landmark in the copyright regime of India. For the first time in India, the Copyright Law clearly explained the rights of copyright holder, position on rentals of software, the rights of the user to make backup copies and most importantly, the amendments imposed heavy punishment and fines for infringement of copyright of software.

Software creates unique problems because it is so easy to duplicate and the copy is usually as good as original. This fact, that the copy is as good as original, however, does not legitimate piracy. The Copyright infringer may be tried under both civil and criminal law.

According to section 14 of the Copyright Act, it is illegal to make or distribute copies of copyrighted software without proper or specific authorization. The only exception is

provided by section 52 of the Act, which allows a backup copy purely as a temporary protection against loss, distribution or damage to the original copy.

The 1994 amendment to the Copyright act also prohibits the sale or to give on hire, or offer for sale or hire, any copy of the computer program without specific authorization of the Copyright holder.

A civil and criminal action may be instituted for injunction, actual damages (including infringer's profits) or statutory damages per infringement etc. Moreover, with the amendments to Indian Copyright Act in 1994, even the criminal penalties have substantially increased. Section 63 B, stipulates a minimum jail term of 7 days. The jail term could be extended up to three years. The Act further provides for fine ranging from Rs. 50,000 to Rs. 2,000,000, and jail term up to three years for such an infringement.

The following extracts from NASSCOM sources on their activities provide some aggressive guidelines for their enforcement and education practices in these areas.

> Agencies of Government of India have been very actively participating in protection of the rights of Copyright holder. Both Department of Electronics and Ministry of Human Resource Development have been active in incorporating amendments to the Indian Copyright Act. These agencies are now helping the law enforcing agencies e.g. the Police to enforce the law. Today, officers of these government agencies as well as NASSCOM are committed to enforce copyright laws and eradicate the menace of software piracy. Anti-Piracy raids jointly facilitated by NASSCOM and Business Software Alliance with active cooperation from law enforcing authorities over the last two years at some of the pirates in metro as well as smaller cities have already had salutary effect." As shown above, India has recently instituted one of the toughest copyright acts in the world to support its IT industry in the international marketplace.
>
> NASSCOM long ago recognized that litigation should not be the primary vehicle for broadcasting the anti-piracy message. Starting in 1990, NASSCOM began an active public awareness campaign to educate users about the lawful use of software. This campaign includes an advertisement campaign, anti-piracy stickers, mailers, seminars etc. NASSCOM has also launched the country's first anti-piracy hotline. NASSCOM has also actively facilitated law enforcement against pirates in India.

NASSCOM has established a special anti piracy (Hotline) telephone number (011 6114971) at New Delhi. It provides the following services: -

- It provides the caller all possible information on sources and retail outlets, wherein the caller can purchase legal copy(ies) of a particular software
- The hotline provides information on various aspects of Copyright Act in India.
- It provides the caller, information on legal use of software.
- It receives information on suspected incidents of software piracy. This information is passed on to the affected / concerned member company.
- The caller can also book an EDP Audit Kit on the Hotline.

In 44-month period since the launching of anti piracy Hotline on 12 August 1994, more than

16,255 calls have been received at NASSCOM. An analysis of these calls indicate the following:

- 43% of the callers sought information about sources to obtain legal/original software e.g. where to buy Lotus or MS Office, Tally etc.
- 41% of the calls related to suspected cases of software piracy
- 5% callers wanted information on Copyright Law
- 7% callers wanted information on the procedure of getting their software copyrighted in India.
- 4% were miscellaneous calls

The Pakistan Experience

Like many other countries in Pakistan's region, corruption is high in the private and public sector. The corruption is most prevalent in the transportation, oil and gas, and steel industries. Some estimates indicate that 30 to 40% of the original cost of many projects is paid for kickbacks and commissions.

Pakistan has instituted several rules and established governing bodies in an effort to improve the situation. For intellectual property protection, Pakistan is a member of the:

- World Intellectual Property Organization (WIPO)
- Universal Copyright Convention
- Bern Copyright Union

Intellectual property rights of the software houses will be protected under intellectual property protection laws. The Pakistan Software Export Board will facilitate actions against parties through the government's legal channels.

The Federal Investigation Authority conducts investigations into property rights violations. The Accountability Coordination Cell, established in the Prime Minister's Secretariat is designed to monitor the problem. Since 1997, 250 cases have been booked. Unfortunately, despite these efforts enforcement of property rights legislation is ineffective and penalties are weak.

Customs Laws

Customs Laws Committee

The Customs Laws Committee (CLC) should be the vehicle to deal with issues related to software industry requirements and changes.

Role

The CLC has the responsibility to identify and formulate recommendations for regulatory changes and enforcement in customs laws that affect the software industry. The committee consists of a chairman, who is a member of the Organization staff, and representatives from Ministry of Finance, Customs Authority, Ministry of Interior and the software industry.

The chairman reports to the Chairman RRWG and is responsible to coordinate the committee, define its strategy, identify and prioritize the items for reform, and plan and execute a customs law reform agenda. The CLC can also seek/appoint external consultants to research and advise the committee where necessary.

Committee Structure

Chairman- ESO staff member

Secretary – RRWG secretariat

Representatives from:

- Ministry of Finance
- Ministry of Trade and Supply
- Customs Authority
- Ministry of Interior – domestic enforcement issues
- Industry representative - software industry association executive
- Egyptian World Trade Organization Delegate

Other decision support as necessary

Agenda

Improving the customs laws will provide easy access to computer equipment and software by developers, thus, encouraging growth in the software development market in Egypt. In addition, easy access to computers, by consumers, will create broader computer usage in country and subsequently, create interest for students to become programming technicians.

Improving laws related to software exports will help to accelerate growth in the industry, because export revenues will become the primary source of industry growth. More efficient and favorable export laws, regulations and procedures will encourage Egyptian companies to look for revenues in the global market.

A number of issues were identified in the Harvard report of 9th May 1999 with recommendations as follows:

- Remove tariffs, fees, assessments, customs duties, licensing requirements, prior

permission requirements, quantitative restrictions and any other restrictions on the importation of computer hardware, peripherals and software.

- Establish simple, non-changing, customs procedures for computer products.
    - Consistent, easy to follow, border clearance processes.
    - Streamline, fast, registration and customs procedures.
- Provide better training to customs officials to improve the customs processes
- Improve the import process
    - Easy Importer registration
    - Continue to assure import letter of credit processes remain unencumbered
    - Continue to assure foreign exchange availability for purchase of computer-related products.
- Improve Export processes and regulations
    - Eliminate export fees, regulations, policies or procedures that delay or inhibit the export of software.
    - Maintain Export Processing Zones with tax and duty exemptions.

Regulatory Status

Trade reform in Egypt has been significant, but domestic industry remains protected by relatively high tariff rates and non-tariff import barriers.

In October 1996, the maximum tariff rate was cut to 55 percent, and tariffs across the board were reduced by ten to fifteen percentage points. The lowest rate was maintained at five percent. Although tariffs were reduced, the Government imposed a "service fee" surcharge of between 3 and 6 percent (depending on the custom duty of the imported item), which undermined much of the benefit of the customs rate reduction. In late 1996, the government pledged to reduce this over time.

In addition to the custom tariff, a sales tax ranging between 5 and 25 percent is added to the final customs value of the imported item.

As Egypt reduced tariff rates and eliminated import bans, many items that were relieved were added to the list of commodities requiring inspection for quality control, including food stuffs, spare parts, construction products, electronic devices, appliances, and many consumer goods.

In addition, Egyptian customs procedures have been complicated, subjective, and rigid in areas such as duty rates. Tariff valuation is calculated on the so-called "Egyptian selling price", which is based on the commercial invoice that accompanies a product the first time it is imported from any source. Customs authorities retain information from the original commercial invoice and expect subsequent imports of the same product to have a value no lower than that noted on the invoice from the first shipment. As a result of that expectation, and the belief that under invoicing is widely practiced, customs officials have been routinely increasing invoice values by 10 to 30 percent. The recent initiatives in improving the customs database and information processing system should improve this situation with better controls and transaction efficiency.

Egypt has made very significant progress in bringing down its tariff differentials to the range of 5-40%, removing all export quotas, import bans and prior approvals. In addition, it has made significant progress in reducing bureaucratic barriers, and streamlining the administration of the drawback and temporary admission systems.

Despite all the good progress, the 1998 average bound tariff was 45%, which is well in excess of the current average tariff for developing countries and one of the highest in the region. It has been projected to decline to 37% by 2005.

A July 1998 report to the Government of Egypt (GOE)[1] made the following observations:

> "Current tariffs are high and uneven. The average nominal rate of protection in manufacturing, excluding beverages and petroleum refining, is 24.6%. The average effective rate of protection (ERP) in manufacturing is 34.22% and highly non-uniform, with some rates well over 80%.
>
> Current import tariffs are inconsistent with the GOE's export promotion strategy. By raising the price of domestically produced and sold goods relative to export prices, the tariffs create an anti-export bias and work as a serious deterrent to export performance. We estimate that the tariffs amount to a 19.4% export tax economy-wide. Such a tax falls especially hard on non-traditional exports, which cannot absorb much of a tax on profits and still be price competitive on world markets. The effective rate of protection for exporters in every sector of the economy is negative and often large. Even with duty drawback, the tariffs burden exporters. On average, potential exporters of manufactured goods receive a 21.7% premium for not exporting but selling on the domestic market."

Furthermore:

> "GOE regulations in quality control, port management and price setting of basic services act as non-tariff barriers (NTB's) to trade and investment throughout the economy. These NTB's significantly magnify the tax on exports levied through the current tariff and tax system.
>
> The "red tape" costs of quality control related clearance delays alone are equivalent to a 10% export tax, (estimated by the World Bank in 1997 Country Economic Memorandum) while inefficiencies in port operations add an additional 10% to the costs of imported inputs."

The Report made the following recommendations:

- continue current policy of cutting the highest tariffs even more aggressively

- target a goal of a low, uniform tariff in the range of 10% - 15%

- improve duty drawback and temporary admission

- aggressively pursue a deeper integration with the global economy through an European Mediterranean Agreement

---

[1] Nathan Associates Inc., "Enhancing Egypts's Exports" –*GOE Ministry of Trade and Supply, US Agency for International Development Cairo*,. June 1998

- •   aggressively pursue direct export promotion activities and programs to improve production efficiency in those industries benefiting from a more favorable, reformed tariff structure."

- •   The objective for the CLC must be develop customs reforms that will establish an environment that stimulates local development and export investment for software companies. The problems seem well identified on a national basis and the challenge is to focus on the industry sector issues. As discussed above customs policy can have a major negative influence on export incentives.

- •   A representative example of other nation's approaches to customs reform is shown below. India has established a number of customs concessions for both hardware and software developers.

The Indian Experience

India's software trade with European nations is growing rapidly and India is increasing its joint venture and strategic alliance activity in Europe. The government backed software association NASSCOM, under the aegis of Ministry of Commerce - Government of India, has initiated a project called NASSCOM India-Europe Software Alliance (NIESA). This alliance, which is partly funded by the Commission of the European Communities, is expected to further increase software exports to Europe.

Since 1990, as part of the economic liberation, India has slashed duties on software imports from 60% to 12%. The Indian government is planning to introduce additional concessions for the IT sector that may include zero tariffs and the abolition of service tax for the software industry. IT products will be able to be fully depreciated over 2 years and World Trade Organization agreements will also force lowering of tariffs in several areas. With all this being said, the future of the Indian software industry is unsettled. The government has recommitted itself to the industry and is trying to both lower controls and strengthen the infrastructure to facilitate rapid growth.

Export-oriented corporations fall under regulations that make dealing in the domestic marketplace nearly impossible. In fact, many foreign companies dealing both internally and with export sales, set up two distinct operations with dramatically different ownership structures and places of business. Their export arm can be up to 100% foreign owned while their domestic arm can only have up to 51% non-Indian ownership.

One of the most successful programs of the Government of India has been Software Technology Parks (STP) scheme. The program implemented by Software Technology parks of India (STPI) under the aegis of Department of Electronics, Government of India has been specifically designed to attract foreign investment and to make software exports a viable option for local Indian entrepreneurs. It offers unique campus offices/plant facilities and regulations for software companies dealing solely/primarily in the export marketplace. Today there are 8 STPs with over 600 companies who have been accorded approval to operate under this scheme. 63% of all Indian offshore development revenue comes through STPs. Their customs provisions include

- •   Duty free import of capital goods (subject to meeting export obligation)
- •   Up to 25% production can be sold in Domestic Tariff Area (DTA)

- No excise duty payable on local purchases
- STP units can import telecommunications infrastructure with zero custom duty and without any export obligation
- Domestic purchases eligible for benefit of deemed exports
- Capital invested can be freely repatriated after payment of income taxes.

Similar to the STP scheme, an Electronic Hardware Technology Park scheme has been implemented to enhance the ease of doing business and making preferential access to the vast Indian domestic market as an incentive for export production. Salient features are:

- Duty free imports of raw materials, components and other capital imports
- No minimum value addition required (net foreign exchange earned by the unit expressed as the percentage of FOB value of exports.) Access to domestic market if value addition is 15% and more
- Sales to domestic market from EHTP units are subject to only 50% of custom duties including countervailing duty leveragable on similar imported goods
- No import license required for DTA sales of even negative list items

The Government has established Free Trade Zones or Export Processing Zones (EPZs) to provide internationally competitive facilities and an infrastructure that includes factories at concessional rate and a duty free low cost environment for export promotion.

100% Export Oriented Units can be established outside the Zones, anywhere in India and all the incentives available to units in EPZs are also applicable to EOUs. Foreign Equity Participation up to 100% is permitted in 100% EOUs and units in EPZs.

Incentives Available to EOUs/EPZs are:

- Duty free import of CG, raw materials, components, spare parts and consumables, office equipment and material handling equipment
- Goods supplied to the units in Zones or in EOUs from the Domestic Tariff Area are treated as Deemed Exports eligible for export incentives
- Permission to sell in DTA up to 40% of the production when value addition exceeds 25%, and up to 30% of the production when the value addition equals 15% and 25 %.These sales also incorporate 50% of normal customs duty for the same product when imported from outside India)
- Permission to sell in DTA up to 25% of software production
- Sales to other 100% EOUs/EPZs and EHTPs are treated as exports

Tax Laws

Taxation Reform Committee

Role

The TRC has the responsibility to identify and formulate recommendations for regulatory changes in taxation laws that affect the software industry. The committee consists of a chairman, who is a member of the Organization staff, and representatives from Ministry of Finance, Taxation Authority, Ministry of Interior and the software industry.

The chairman reports to the Chairman RRWG and is responsible to coordinate the committee, define its strategy, identify and prioritize the items for reform, and plan and execute a tax law reform agenda. The TRC can also seek/appoint external consultants to research and advise the committee where necessary.

Committee Structure

Chairman - ESO staff member

Secretary - RRWG Secretariat

Representatives from:

- Ministry of Finance
- Taxation Authority
- Ministry of Interior –
- Industry representative - software industry association executive
- International tax expert

Other decision support as necessary

Agenda

Improving the taxation incentives for software companies will encourage investment and liquidity for growth of the industry. In addition it should foster export earnings growth and foreign investment at a time where domestic funds are more difficult than they should be to attain.

A number of taxation issues were identified in the Harvard report of 9th May 1999 and the following recommendations were made:

1) Establish software industry expertise and a related "industry expert group" in the income tax authority and other pertinent tax authorities.
   a) Empower "group" to deal with software company tax issues.
      i) Facilitate industry's operation in global marketplace.
      ii) Reduce possible time-consuming audits/negotiations.
      iii) Ensure fair payment of taxes.
   b) Educate all tax authority employees as to existence and charter of the TRC
   c) Ensure all software company tax issues are referred to the TRC

2) Apply and maintain sales taxes at the lowest possible levels on software and hardware.

3) Eliminate all taxes on software development tools and their updates for software development firms.

4) Remove advertising taxes on compute hardware promotion, peripherals, and software

5) Eliminate government service fees.

6) Broaden "tax holiday" structure:

   a) Enable software companies to include revenue and profit growth about a pre-set level that would enable a tax holiday.

   b) Grandfather existing firms into the tax holiday.

   c) Provide tax breaks for multinational cooperation in transferring technology from multi-national firms to Egyptian firms.

   d) Subsidize salaries for first year staff through reduced taxation.

Regulation Status

Egypt has introduced a series of tax reforms aimed at reducing dependence on revenues from customs duties while increasing revenues from domestic taxes and improving the transparency in the tax system as a whole. In December 1993, the Egyptian parliament enacted a global income tax law that replaced four so-called scheduler taxes and a complementary general income tax with a general income tax. In the new tax, the top marginal tax rate was reduced to 40 percent from 65 percent, and a single tax structure was specified for most sources of income. The new tax law specifies important exemptions, including for corporate dividends (to avoid double taxation) and higher personal exemptions to benefit low income groups. Maximum corporate income tax rates declined recently from 48 per cent to 40 per cent, as a part of the Ministry of Finance program to increase tax efficiency by reducing tax rates and broadening tax base. The government is currently reviewing the corporate income tax.

Corporate taxation levels are very high in Egypt and it is complex to set up business operations for without understanding how to "get things done" with the complex regulations. However most software companies can now enjoy a tax holiday of anywhere from 5-20 years dependent on the location of the company. In addition, many firms complained about high levels of taxation for advertising. This level of taxation makes it very difficult for new and smaller business to effectively advertise their products in the domestic marketplace."

The Egyptian government provides a "tax holiday" for companies in selected industries, of which software is one. The first level, a 5-year exemption, applies to software companies in general. The 10-year and 20-year exemptions are dependent, however, on the physical location of the company (new industrial cities and Upper Egypt, respectively).

In general, the corporate tax rates, although reduced, are still high at 40% and above, and are a disincentive to software companies to invest in their growth and produce a profit. Taxes on print and TV advertising are also very high at 36% and do not encourage packaged software developers to advertise their products.

Three examples of taxation reform for software enterprises are shown below. Each illustrates significant incentives for investment in the industry.

The Indian Experience

The Indian government has been very active in promoting foreign investment with special foreign ownership rights, tax abatements and an industry-specific authorization to repatriate profits from the Indian operation."

One of the most successful programs has been the Software Technology Parks (STP) scheme. The program implemented by Software Technology parks of India (STPI) under the aegis of Department of Electronics, Government of India has been specifically designed to attract foreign investment and to make software exports a viable option for local Indian entrepreneurs. It offers unique campus offices/plant facilities and regulations for software companies dealing solely/primarily in the export marketplace. Today there are 8 STPs with over 600 companies who have been accorded approval to operate under this scheme. 63% of all Indian offshore development revenue comes through STPs.

- Automatic approval for foreign investment up to 100%
- Tax holiday for a block of five years in the first eight years of operation
- Duty free import of capital goods (subject to meeting export obligation)
- Up to 25% production can be sold in Domestic Tariff Area (DTA)
- No excise duty payable on local purchases
- STP units can import telecommunications infrastructure with zero custom duty and without any export obligation
- Domestic purchases eligible for benefit of deemed exports
- Capital invested can be freely repatriated after payment of income taxes."

Similar to the STP scheme, an Electronic Hardware Technology Park scheme has been implemented to enhance the ease of doing business and making preferential access to the vast Indian domestic market as an incentive for export production. Salient features are:

- Foreign equity up to 100% permissible
- Duty free imports of raw materials, components and other capital imports
- No minimum value addition required (net foreign exchange earned by the unit expressed as the percentage of FOB value of exports.) Access to domestic market if value addition is 15% and more
- Sales to domestic market from EHTP units are subject to only 50% of custom duties including countervailing duty leveragable on similar imported goods
- Complete tax holiday for five years
- No import license required for DTA sales of even negative list items"

The Government has established Free Trade Zones or Export Processing Zones (EPZs) to provide internationally competitive facilities and an infrastructure that includes factories at concessional rate and a duty free low cost environment for export promotion.

100% Export Oriented Units can be established outside the Zones, anywhere in India and all the incentives available to units in EPZs are also applicable to EOUs. Foreign Equity Participation up to 100% is permitted in 100% EOUs and units in EPZs.

Incentives Available to EOUs/EPZs are:

- Duty free import of CG, raw materials, components, spare parts and consumables, office equipment and material handling equipment

- Goods supplied to the units in Zones or in EOUs from the Domestic Tariff Area are treated as Deemed Exports eligible for export incentives

- Permission to sell in DTA up to 40% of the production when value addition exceeds 25%, and up to 30% of the production when the value addition equals 15% and 25 %.These sales also incorporate 50% of normal customs duty for the same product when imported from outside India)

- Permission to sell in DTA up to 25% of software production

- Complete exemption from Central Sales Taxes on production and sales

- Tax holiday for a period of five consecutive years in the first eight years of operation

- Exemption from tax on export earnings after the period of Tax Holiday as per the norms specified by the Government

- Sales to other 100% EOUs/EPZs and EHTPs are be treated as exports"

For non-export related software and hardware production, foreign company investing in India can take advantage of government programs providing:

- Automatic approval of 51% foreign equity (74% in some specific cases)

- No limit on debt investments

- Profit repatriation after taxes allowed (35% on companies, 10% on dividends)

- Double taxation treaties with most countries

- Free import of capital goods and products permitted

- Liaison office allowed with permission (5 year charters)

- Can spend but not invest

- Can acquire property

The Ireland Experience

This favorable positioning was enhanced in the 1980's as Ireland initiated a corporate tax rate of 10% for technology companies versus 33-58% in Europe. A telling quote is: "Small countries on the fringe of rich trading partners can prosper mightily."

Recently, EEC courts found discrimination in Ireland's special tax rate for technology companies in view of their higher tax rates for other companies. In response, the Irish government surprised the EEC by bringing down their corporate rate for all companies to 12.5 % effective next year. While this represents a slight increase for technology companies, it represents a dramatic decrease overall and clearly maintains Ireland's favorable tax advantage.

The Pakistan Experience

Pakistan has traditionally maintained a complex system of indirect taxes in the trade sector. Basic tariffs, surcharges, excise and sales taxes for domestic and foreign goods all distort prices. Many rates are so high that they encourage smuggling and corruption. As a result the policies have been liberalized, and procedures streamlined.

In June 1998, the Pakistan New Service reported a 40-25% Central Excise Duty to be levied on ISP's in Pakistan.

Pakistan has a "deletion policy" which requires that all investments based on local assembly of imported parts, that wish to receive favorable tax rates must have a "deletion policy" to encourage the use of quality conscious local suppliers. Many companies have found it difficult to meet these deletion program timetables through the lack of local infrastructure and are being closely monitored by the Ministry of Industries."

To encourage development of the Pakistan software market, rates of withholding tax have been made uniform for resident and non-resident contractors. In addition, non-resident income from dividend, interest on profits on bank deposits, bonds and certificates is taxed at 10% and winning proceeds of prize bonds and raffles shall be charged at a rate of 7.5%. Finally, a presumptive tax has been extended to exporters and the tax withheld by the banks on foreign exchange proceeds received by exporters (excluding manufacturers enjoying the tax holiday) will be treated as full and final discharge of tax liability.

Financial incentives

Financial Incentives Committee

Role

The FIC has the responsibility to identify and formulate recommendations for improving financial incentives for investment in the software industry. The committee consists of a chairman, who is a member of the Organization staff, and representatives from Ministry of Finance, investment banking, Ministry of Trade, Ministry of Interior and the software industry.

The chairman reports to the Chairman Regulatory Reform Working Group(RRWG) and is responsible to coordinate the committee, define its strategy, identify and prioritize the items for reform, and plan and execute a financial incentives agenda. The FIC can also seek/appoint external consultants to research and advise the committee where necessary.

Committee Structure

Chairman - ESO staff member

Secretary - RRWG secretariat

Representatives from:

- Ministry of Finance
- Ministry of Trade
- Ministry of Interior
- Investment Banking
- Industry representative - software industry association executive

Other decision support as necessary

Agenda

One of the largest issues to address in the development of the software industry is access to capital both for growth of existing companies and for the start of new ventures. The entrepreneurial nature of the industry imposes new challenges to a conservative banking industry and the FIC must devise incentives to stimulate institutional, personal, and foreign investment in the industry

A number of issues were identified in the Harvard Computing Group report of 9[h] May 1999 with recommendations as follows:

Development and encouragement for the formation of a bank focused on the needs of the software industry.

- Short-term loans
- Consideration for Collateral Valuations and factors.
- Lines of credit
- Leasing (equipment and facilities)

- Venture capital
- Investment funds

Trade Improvements

- Tax incentives on income produced outside of Egypt.
- Government guaranteed loans with preferential rates to companies producing substantial portions of their revenue outside of Egypt.
- Amounts should be equitably allocated to all industries, including software.
- Free Trade Zone system should be expanded.
- Identify opportunities for alliances with the US and European Union via developmental schemes sponsored by foreign governments.
  - Identify joint venture partners for software development.
  - Provide distribution channels to market software products locally.
  - Assist companies that want to do offshore development.
  - Assist joint product development between Egypt and European companies.
  - Assist matchmaking between companies from overseas and Egypt according to specific requirements.

Regulatory Status

Although Egypt's banking system has undergone great change over the past few years, it continues to be dominated by government institutions which allocate a large portion of private savings to finance public sector debt. In addition, the bulk of business credit is directed to large firms. Small businesses, which generate most of the nation's value added and employment, are generally excluded from formal financial institution financing, including trade finance, and are forced to rely on informal and self financing.

Small to medium companies represent over 98% of business volume in the economy but, commercial banks advance less than 6% of their loans to this group and trade financing is a very low 1%. Consistent with the low export volume from this sector, banks have very little capital in export financing.

Because five large government-owned banks control the majority of financial resources of the nation, there is insufficient competition to keep pace with the needs of new business ventures like software. These banks and a handful of private and joint venture banks do most of the export financing. Lending for small business export appears to be virtually non-existent.

Current government policies toward small business lending for exporters, implemented largely through special subsidized lines of credit for exporters, and through a social funding initiative, is ineffective because they reduce incentives to lend, have high default rates, and don't require the institution to understand and develop programs to meet the requirement.

As a further issue are excessive bank collateral policies, which vary with requirements ranging from 110% to 200% of loan value. The end result of these policies is that there is insufficient local capital available for software companies to either start-up, launch new products, or invest in developing new markets or export opportunities.

The solution needs to be formulated from a combination of reform in governmental financing and banking policy as well as direct incentive schemes. A list of recommendations on the former includes:

- Allow additional foreign banks
- Allow free market interest loan rates for small business
- Accelerate the privatization of the banking system.
- Mandate full disclosure in bank financial reporting
- Monitor and maintain oversight of bank competitive practices
- Modify collateral requirements for the sector
- Establish a banking specialization for this sector

Some of the direct incentive options are listed earlier in this report but the FIC will need to construct a coordinated plan that integrates and balances a wide range of financial considerations for the industry.

The experiences listed below illustrate a wide range of financial support measures and the extensive governmental commitment to the enterprises. Significant governmental underwriting of start up costs and on going research, development and marketing is common throughout the countries studied. The results of these initiatives have been impressive.

Israel Experience

The Israeli Law for the Encouragement of Industrial Research and Development enables high-tech companies to know exactly what they may receive from the government and the length of time it is available. It also promotes start-ups allowing them 66% aid versus 50% for more established industries.

The Chief Scientist of the Ministry of Industry and Trade is responsible for implementing this law and providing suitable R&D grants to achieve objectives. Under this law, when a project succeeds, the entrepreneur repays the grant based on a rate of 3% of project-related revenues. When a project fails, it is the government's money that is lost.

In 1996 $400 million was distributed and income from royalties on commercialized products was $60 million.

With broad-reaching responsibility under this law, the Office of the Chief Scientist of the Ministry of Industry and Trade has programs offering a number of industries a wide range of support. The software industry is included among these industries.

1. **Standard R&D Programs**

   - A 50 percent support level is granted for a program that "leads to know-how, processes or systems" for manufacturing a new product/process or substantially improving an existing one.
   - A grant of 30 percent is available for R&D leading to improvements in an existing civilian product.
   - Companies that benefit from an outside, tax deductible (non-share) investment in R&D expenses can receive a grant of five percent of the expenditure on R&D, after deducting the outsider investor's contribution.

2. Start-up Companies

These can obtain up to 66 percent of R&D costs, with a ceiling of $250,000 a year for two years.

3. Research and Development

Performed in designated development areas may qualify for 60 percent of expenditure being rebated.

4. Bridging Aid

- Aid for the transition period between R&D and manufacturing/marketing is intended to enable factories that have completed R&D to manufacture a number of prototypes for installation on the premises of potential clients, especially abroad. This enables the manufacturer to obtain feedback of the product's performance, in order to prepare a final, marketable version of the product.

5. Aid in Establishing Industrial Incubators

The program aims to encourage established companies to cultivate business opportunities in new technological areas, benefiting from the companies infrastructure, finance and management. The OCS grants 66 percent of the approved R&D outlay, up to a ceiling of $300,000 annually for a maximum of two years.

6. Feasibility Studies for Industrial R&D Programs

- This refers to studies of the market potential of a new technology, prior to the investment of large sums in the R&D and manufacturing stages. It is intended primarily for start-up companies, or those with limited R&D experience. But older, larger companies investigating new subjects not included in their current areas of activity are eligible as well. Grants of 50 percent of approved costs, up to a maximum of $25,000, are available if the study pertains to a single continent, and up to $30,000 if the study extends to two or more continents.

7. Technological Incubators

- The program aims to set up a support system for encouraging business initiatives in technological fields. It consists of centers or frameworks (incubators) that house groups of scientists, particularly new immigrants, who develop new products or processes for commercial purposes. Each incubator accommodates at least 10 projects. The incubator receives annual grants of up to $150,000, depending on the volume of the projects, and each individual project receives up to $150,000 annually for a maximum of two years. The grant pays 85 percent of labor costs and other expenses.

8. Magnet

- This program of generic R&D aims to encourage the formation of consortia of industry and academic institutions in order to develop key technological infrastructures. Magnet also supports the integration of advanced technologies into industry via users associations. Grants of 66 percent of the total approved R&D cost are available, with no royalty requirement.

9. Aid For The Individual Technology Entrepreneur.

- In general, the OCS itself deals with R&D projects carried out in companies. However, it has also established, together with the Ministries of Immigrant Absorption and Science, the IPC (Idea Promotion Center - MESER), a body that acts within the MATIMOP framework and provides a special venue for the individual technology entrepreneur and inventor, as well as new immigrants with scientific and technological skills. IPC helps them during the early stages of the idea, to assess the technological and economic feasibility, to prepare a file for a patent application, to construct a model of the idea, prepare a business plan, link up with the right industry, and find investors. Grants, which must be paid back if the project is successful, are also offered from a fund with government and Manufacturers Association financing."

The Israeli Ministry of Industry and Trade fosters the "development and progress of the domestic industry, the development of international commercial activity, the encouragement of industrial research, and the development and improvement of marketing and commercial resources." In addition to the OCS, the Ministry activities include:

- The Center for Business Promotion which exposes the international business community to the advantages of cooperation with Israel and seeks partners for Israeli companies. The Center hosts fairs, seminars and meetings.

- The Israeli Investment Center which sets government policies for the encouragement of capital investment and for designating "approved" enterprise status enabling tax and investment incentives."

- The Israeli Ministry of Industry and Trade also offers a 2.5% of export revenue rebate for selected industries that include the software industry.

Ireland Experience

The Forbairt (state support to industry) and The Irish Trade Board (promoting external trade) are being merged to form Enterprise Ireland with an overall mandate to grow Irish industry. This new entity reports into Farfas, the government policy agency. Its goal to help increase the rate of growth in the sales, exports and employment levels of Irish industry. As software is an important industry sector, Enterprise Ireland is actively involved in promoting software industry growth. Enterprise Ireland has 11 offices in Ireland, 15 in Europe, 8 in the Pacific Rim and 3 in the United States.

Key efforts of Enterprise Ireland are:

- "Technology Ireland" - a publication on Irish industry communicating the latest developments in technology

- Science and market information center and library.

- Export marketing program that provides reimbursement of up to 50% on a long-term loan basis to cover export marketing costs. This program is available to indigenous companies and foreign subsidiaries that make their marketing decisions in Ireland. The loan and interest is to be repaid from profits growing out of program-

related exports. If the program is unsuccessful in building profitable exports, the loan is forgiven.

- Coordinated initiatives for international collaboration and Irish "Technology Centres" (office parks and support systems solely focused on technology companies).
- Project and business development advice and support.
- Access to grant, equity and early-stage discretionary funding.
- Salary subvention of up to IR£5,000 during the first year of a "new hire" staff addition.
- Flexible business training inputs.
- Technical evaluation and guidance, including advice on patenting and licensing issues.
- Business mentoring.
- Access to the Innovation Centre's wide range of business incubation and development support programs.
- Research technology and innovation initiatives providing funding for companies across the European Union to develop and enhance innovative products and processes.
- Application Development Initiatives offering grant aid for software development and enhancement to end-user companies working with Irish software developers.
- Grants to businesses for research, technology and innovation
- Award programs funding strategic projects that bring academics and industry together"

Export Promotion

Export Promotion

Despite low labor costs, rich natural resources, and an advantageous location, Egypt's share of world exports and imports has declined over the last 10 years, as has the openness of the economy.

Furthermore, the rate of increase in export trade is one of the lowest in the developing world although the rate of foreign investment is improving.

As illustrated in India and Ireland, the software industry has the potential to significantly impact national export performance. As mentioned elsewhere in this report, the low cost but well educated labor pool in Egypt represents a key asset. However the infrastructure lacks the commercial skills and resources to exploit the potential. The establishment of an organization that can bring marketing focus and resources to develop the opportunity is clearly important to the future of the industry. Organizations such as ExpoLink can assist dramatically in the development of these efforts, representing the private sector effectively.

The Egyptian government currently has four export promotion agencies under the Ministry of Trade and Supply (MOTS):

- Commercial Representation Sector
- Egyptian Export Promotion Center
- Egyptian International Trade Centre
- General Organization for International Exhibitions and Fairs

These agencies are in the process of being reorganized to eliminate overlapping functions and provide better focus on measurable goals. The agencies have been focussed on traditional markets and have little or no experience in high technology.

Key to the development of an export promotion plan is a clear view of the focus and goals of the industry. One of the most important functions of the ESO will be the development of a strategic plan for the Egyptian software industry that can be used for many planning and implementation functions (see Plan Overview). This involves an assessment of the national assets and the World's markets and will lead to the identification of target markets for the industry. This is a key activity and undertaken by most of the governments reviewed in our study. This plan provides the foundation required to develop and maintain an export promotion strategy.
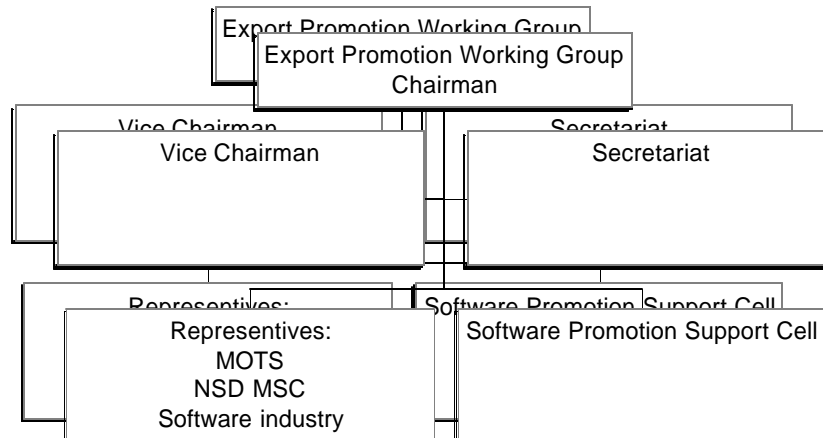
The Export Promotion Working Group

Role

The role of the EPWG is to develop and maintain a national promotion strategy for software exports, consistent with the national software plan, and to support its implementation through the MOTS and other governmental and industry agencies. The group will also monitor and report to the ESO on the results of each of the initiatives and, where necessary, any changes required.

The group consists of a Chairman, Vice Chairman, a secretariat, a support cell and a number of representatives from other parties. The Chairman, an employee of the ESO, reports to the Director ESO.

```
                    Export Promotion Working Group
                    Export Promotion Working Group
                              Chairman

        Vice Chairman                        Secretariat
        Vice Chairman                        Secretariat



        Representives:              Software Promotion Support Cell
        Representives:              Software Promotion Support Cell
        MOTS
        NSD MSC
        Software industry
```

The role of the Chairman is to:

- Lead the EPWG and be the ESO spokesperson on software export promotion
- Plan and execute the export promotion strategy in accordance with policy directives and budgetary constraints
- Monitor and coordinate the implementation of the plan with the other responsible agencies.

Structure

The structure of the EPWG is as follows:

Chairman – ESO staff member

Vice Chairman – ex officio position

Representatives from:

- Ministry of Trade and Supply (management of the government export promotion units)
- Software industry
- Representative from ExpoLink
- ESO's Market Resources Center (MRC)

Software Promotion Support Cell – a team of 4 specialists whose role is to support MOTS with training, software market development, and expertise.

Agenda

Fundamental to the group's activity is the national software industry plan to be developed by the MRC. It is expected that the EPWG will be a participant in the preparation of the plan and then will generate an annual promotional plan in consultation with the MOTS agencies. A broad range of activities will emanate from the group including education, marketing, liaison, partnership development, implementation support and facilitation.

The Harvard Computing Group report of 6 May 1999 identified a number of export promotion issues and agenda items for consideration. The recommendations are as shown below:

- Investigate partnerships, strategic alliances, joint ventures and programs available through the European Union and Arab League that can help promote and fund developmental efforts.

- Develop partnership strategies to leverage resources available to support industry development. For example:

  - USAID, European AID, NIESA, NASSCOM

  - ECIP Scheme of Commission of the European Community

- Provide distribution channels to European companies to market their products in the emerging markets in the Middle East and the Gulf.

- Assist European and US companies who many want to do offshore development in Egypt.

- Provide matchmaking between overseas companies and Egyptian companies according to the project's specific requirements.

- Assist joint product development between Egypt, European and US companies and then help to identify markets in USA, Japan, Europe, India, Australia, etc.

- Educate the relevant Export organizations on the specific needs and issues of the software industry.

- Establish a marketing and support plan to include:

  - Promotional tours and networking initiatives

  - Education and enrollment in promotion of the software industry of trade representatives in Egyptian missions, consulates and trade development offices.

  - Provide representation at foreign conferences and trade shows.

  - Host seminars and trade shows.

  - Identify an on-going basis financing and assistance opportunities for the industry in Egypt and through new and existing international programs.

Factors

Several recent studies [2,3], which have analyzed rapid export growth characteristics, have found that:

- The rapid growth required many new companies breaking into new foreign markets.

- Companies exporting before the growth did not dramatically increase their shipments during the rise.

- Breaking into new export markets involved significant "start-up" costs:

- Market research

- Product and packaging development

---

[2] Roberts, Mark J. and Tybout, James R.,"What Makes Exports Boom?" *The World Bank*, 1997

[3] Nathan Associates, "Enhancing Egypt's Export Promotion Program: Micro Strategies" *US Agency for International Developmen*t, 1998

- Developing distribution channels
- Acquiring the process knowledge and expertise

As more companies became involved these costs declined as experience was gained and economies of scale were achieved in support services.

The reports also conclude that:

- Government must play a role in convincing businesses that there is a good return on start up cost investment.
- Governments must assist in mitigating or defraying export start up costs for

businesses and bringing focus on long term marketing strategies. The Government's export promotion programs should:

- Provide timely direct support and/or subsidy to exporters
- Educate companies in long term planning in developing markets abroad and;
- Attract new exporters. Interviewed companies all agreed that they needed more market entry knowledge and skills to enable them to successfully penetrate foreign markets.
- Provide direct marketing assistance for the development of a national and industry sector long-term strategic plan. ESO's Marketing Support Center has the role of developing and maintaining this plan for the software industry

Considering that estimates of active exporters in the Egyptian economy number as low as 200, there is a very large task ahead to increase the number of companies involved. As the software industry has virtually no export presence, the barriers inherent and the effort required is somewhat daunting.

As mentioned earlier, the four export promotion MOTS agencies have little or no experience in the software industry. They will need a great deal of support to become effective in this and other high technology markets. This will impose significant additional workloads in training, marketing, and facilitation in the first 12 months of EPWG operation.

The experience shown below is an excellent example of a well-focussed market promotion agency from a small, growth-oriented nation. It has made the transition from consumer goods to include high technology and has been successful in promoting a burgeoning software industry. Of particular interest is the good use made of information systems to make available a wide range of interactive services for domestic and international companies and other prospects. This approach is proving to be a very efficient means of export promotion and business development.

The Israeli Experience

One of the best points of comparison for Egypt is Israel's national export promotion agency, called the Israel Export Institute. This is a government body and is now very active in high tech promotion and support. It has a Board of Directors consisting of representatives of government, industry, and banking.

The Mission Statement of the Israel Export Institute is to:

- Promote Israel's International Trade
- Provide Business and Manufacturing Community with Basket of Services - Everything Needed to Advance Export Objectives
- Support all Forms of International Cooperation - Joint Ventures, Strategic Alliances, etc. - in all Technological, Industrial and Commercial Fields
- Link Overseas Inquiries with Relevant Israeli Companies
- Serve as Exporting Community Lobby in Israel's Decision-Making Bodies
- Adapt to New Realities and knowledge

The IEI enables Israel's export-oriented business community to make the most of the dynamically changing global marketplace. Through its ongoing adaptation to evolving needs and trends, the IEI provides a full range of services. Tailored to meet current realities, these services include information, marketing and training.

In recent years, Israel's export industry has undergone substantial changes. Together with a shift from consumer goods to hi-tech, there has also been a move from exports in the traditional sense, that is the sale of products or equipment - to a much broader scope of international trade. This involves participation in international projects, and growing cooperation with overseas companies in the form of joint ventures, strategic alliances, R&D, marketing and co-production agreements, technology transfers, and virtually every form of cooperation acceptable to both parties.

Israel Export Institute
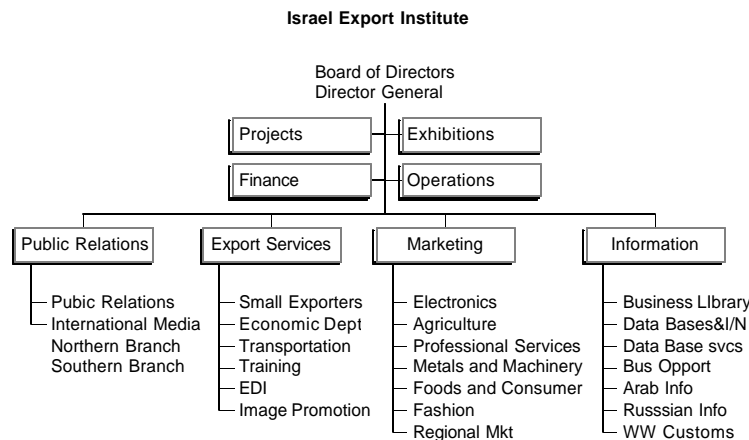
In addition, comprehensive turnkey projects implemented by Israeli companies, often in collaboration with multinational corporations or local companies also account for a growing share of overseas trade.

At the same time, start-up companies and small and mid-size enterprises are playing an increasingly important role in Israel's export picture. In light of these changes, along with geopolitical developments, the globalization process, fluctuations in the world economy and other global trends, the IEI continues to introduce new initiatives. IEI activities, although diverse in scope, all stem from the same objective: to enhance the position of Israeli industry on the international marketplace.

In recent years, the Israeli software industry has seen constant growth, the largest of any export industry, and it has the highest value added in relation to other industries in the country.

A comprehensive survey, recently conducted for the first time the Israel Export Institute in cooperation with the Manufacturer's Association's Software House Organization, presents surprisingly good findings, showing that exports by Israel's software industry in 1997 surpassed $1 billion, a milestone reached nearly three years ahead of forecasts. Amiram Shore, chairman of the Software House Organization and chairman of the board of M.L.L. Software and Computer Industries reported the news.

Shore noted that according to the findings of the survey, which B.O.C. Research and Marketing Consultants conducted and which included about 300 software houses, software exports in the first six months of 1998 rose 20-25% compared to the same period in 1997, and totaled about $700 million.

Information security and network management products contribute the most to exports and constitute about $160 million (16%) of all software exports. In addition, there has been a rapid increase in the number of software exporters. In the past five years alone (since 1994), the number of software exporters has risen by about 375% and today stands at about 300.

The survey also revealed that 220 of the companies each have annual exports of up to $5 million, while eight software companies each export more than $50 million annually. Sixty-six software houses each export less than $550,000 annually.

The 10 leading Israeli software companies last year exported a total of $642 million of products. The next 10 largest companies had exports in 1997 totaling $111 million. Small software exporters contributed about 13% to the total amount of software exports in 1997.

According to the survey's findings, North America is the most important market for Israeli software exports, comprising 38% (about $380 million) of the total; Western Europe is the second most important market, with 37% (about $370 million) of exports; the Far East received 9% (about $90 million); the Asia-Pacific region received 4% (about $40 million) of total exports; South America was the destination for 3% (about $30 million) of the total; Africa received 3% (about $30 million); and other countries accounted for 6% of software exports.

The survey examined many issues related to exports, including, destinations, participating companies, products and technologies, and forecasts for the future.

Shore noted that the competitive advantage of Israeli software companies is usually based on a process of quick development and the development of unique products and technologies for niches and/or in a pioneering technological sphere which beats the competition.

Software Development Parks

Summary

Necessary for the successful development of the Egyptian software industry is the deployment of software development parks (SDPs). The software development parks are modeled, in part, on similar structures and programs in Ireland, India and Israel, but were designed to address the specific needs of the Egyptian software industry. The SDPs address the following software industry needs:

- Reliable utilities
- Flexible facilities and space
- Business development support
- Credibility with customers/partners
- Incubation services and support

The software development parks will support both large and small software related companies. Each SDP will house many software companies, and will provide the services necessary to meet the needs outlined above. The buildings will be wired with modern Ethernet, and will be constructed using modern, flexible materials and designs. They will have shared facilities for large conferences, events, and videoconferencing, as well as shared resources for business development, marketing and administration. The SDPs will have appeal to prospective employees of the software companies based on their location and amenities. They will also make collaboration with partners and customers more convenient because of their location and stable connections to the Internet.

The following section provides recommendations for the content and characteristics of the proposed Egyptian software development parks.

SDP Mission Statement

The following should be the mission statement of the Software Development Park program.

> **To provide an optimal environment for the incubation and ongoing support of Egyptian software and software-related companies, while facilitating the domestic and foreign trade and use of their products and services.**

Goal of the SDPs

The software development parks will provide a range of facilities that should dramatically improve the development and performance of companies located in the park. This will be achieved by:

- Improve the productivity of participating companies through facility and infrastructure improvement
- Improve knowledge and employee productivity by promoting communication and collaboration
- Improve the sales and marketing functions of the industry, by providing world class support services

- Improve ease with which foreign and domestic partners can work with each other
- The park concept is not a new one. Fortunately, many references can be made to ensure that the park system can be designed specifically to meet individual industry and location needs. The development of this program has been based on many success stories in Israel, Ireland and India.

Park Locations

The location of the parks is extremely important to their success. We recommend that sites be chosen based on the following criteria:

1. Proximity to airports
2. Proximity to major highways
3. Proximity to affordable accommodations for university graduates
4. Availability of economical facilities/land
5. Access to modern telecommunications infrastructure

The greater Cairo area has the software development talent necessary to attract top-tier firms into the software development parks. For that reason, we recommend that the first few development parks be located in the greater Cairo area. However, we do not recommend the parks to be built inside metropolitan Cairo due to the lack of affordable housing, affordable facilities/land, and an inadequate telecommunications infrastructure. Instead, we recommend that the first parks be built in either the surrounding "new" cities of the greater Cairo area, or the less expensive/more accessible fringe cities.

Based on our analysis, Heliopolis would be a very good candidate for the first SDP. Its proximity to the airport, affordable accommodations, university graduates, as well as its more economical land makes it a desirable location. While the telecommunications infrastructure in Heliopolis needs work, we believe that the SDP will be able to improve the performance and stability that is currently lacking. The second and third SDPs should also probably be built in the greater Cairo area. Ideally, these parks should be set up in fringe cities similar to Heliopolis. By locating near existing software businesses, each successive park will be able to populate fairly quickly, making it easier to attract new businesses.

Once a sufficient number of parks are built in the greater Cairo area, expansion should be considered into other parts of Egypt. The locations under consideration should be evaluated based on the five criteria listed above, as well as industry and economic trends apparent at the time. As commuting distance and housing expense factor into the equation, it may be possible to build Parks later in the program in newer locations, perhaps linked a more affordable housing program.

Facilities Features

The software development parks must have the facilities necessary for companies to work efficiently, grow, sell, communicate, and make their employees happy. The following table lists and describes the features that we recommend for the parks.

Feature	Description
High Speed Internal communications systems	State of the art telephone and network cabling system.
Drywall Flexibility	Companies need room in their offices to expand and change. In order to accommodate different-sized growing businesses, the buildings in the SDPs must be movable drywall. This will let the space conform to the companies; instead of making the companies conform to the space.
Back-up Power Generators	Reliable power is necessary to ensure security, data integrity, and productivity. A central back-up power solution will ensure continuous power to each of the companies located in the software development parks.
Video Conferencing	Most companies in the parks will do significant work with foreign customers. In order to increase customer service, decrease client offshore concerns, and eliminate unnecessary travel, the software development parks will provide high-quality video conferencing facilities to be shared by the member companies.
High Bandwidth Internet Connectivity	Offshore development necessitates stable, high-bandwidth Internet connections. The current Egyptian telecommunications infrastructure makes it very difficult, if not impossible, for software development companies to install T1 connections. We suggest that the parks install high-speed lines for shared use by the companies inside.
Large Conference Facilities	An effective marketing tool for the Egyptian companies individually, and as a group, will be events at their facilities. High-end events will enable the companies to highlight the quality of their services and facilities, and will create face-to-face sales opportunities. In order to accommodate these events, the SDPs will need large conference facilities. These facilities should contain flexible seating, multimedia capabilities, and close access to a kitchen area. Each large conference facility should be able to accommodate 150-200 people.

Feature	Description
Workout Gym	Many US companies provide workout facilities for their employees free on their corporate campus. In order to keep employee morale high and increase the attractiveness of the developer profession, we recommend that the SDPs install workout facilities. Studies have shown that exercise increases energy and blood flow to the brain, and also increases self-esteem and confidence. It would be a relatively inexpensive way to create appeal for the SDPs from companies and their employees.
Cafeteria	Cafeterias help promote community, and increase the uptime of workers. We suggest that the SDPs have full working cafeterias for their employees, with a variety of food options in a pleasant eating area.

Site Layout

The SDPs should be designed campus style. They should be built on relatively large areas of land, and will contain multiple buildings. Since the design will consist of many buildings, the parks will be able to be built in stages – minimizing cash requirements and construction time. The following diagram shows a possible layout of the facility.

We believe that it is important to build the SDP on land that can accommodate significant growth. As more companies are added to the SDP, the facility will be able to provide more services and features to its companies. The extra land will also help make for easy parking, and will give the SDP developers more flexibility as they grow and improve the facility.

Logistic Support

In order to operate the facility properly, the SDPs will need to install support staff. The

positions needing to be filled are:

1. Janitorial

2. SDP Sales and Marketing

3. General switchboard/operator/reception/security

4. Grounds/maintenance

Business Development, Marketing & Administration Support

Business development, marketing and administration support is an essential feature of the SDPs. The following table summarizes the key business development services that will be provided by the SDP.

Service	Details
Marketing and direct sales support	• Assistance with the development of company specific marketing materials including a web site and marketing collateral (brochures and business cards) • Direct sales support including client visits, tactical sales calls, and demonstrations • Strategic marketing planning • Assistance with marketing program management.
Business, management and strategy consulting	• Market identification • Competitive analysis • Product/service development • Research potential partners • Business planning
Operations support	• Administration: reception, telephone, fax, etc. • Legal and accounting services • Immigration liaison for on-site off-shore projects • Finance: bank accounts and transfers • Coordination of travel and accommodations including: travel, car, lodging, cellular phone
Project support	• Project Management • Application Specification • Client Communication
Technology support	• Web maintenance • Preparation of software demo • Software virus protection • System back-ups

The SDP would provide all of these services (or even most of them) to the companies directly. It will provide central access to these services, and will subsidize the cost of many of them. By providing these services or access to these services, the SDPs will help the Egyptian development companies compete with the larger and more sophisticated software development companies in Egypt, Ireland, and Israel. The services will also help them sell their services into the U.S. market much more effectively.

We recommend that the following parties subsidize the service:

1. Private investors in the SDPs

2. The Egyptian government

3. Vendors (through fees that they pay to the SDPs for access to their member companies)

Incubators

While the SDPs will be constructed to accommodate large Egyptian software companies, they will also include a facility for small start-up firms. These "incubators" will assist small companies in the development of their business plans, product designs, service offerings, marketing plans, tactical sales efforts, general administration, and product development. We suggest that the Egyptian SDPs follow the precedent set by their Irish counterparts.

Irish incubators, with a relatively minimal failure rate, launch 40-50 new technology companies annually. Many of these companies are born from University research and/or government grants. In order to transfer the technology to the marketplace, the originators of the ideas incubate their concepts in Irish incubators. They receive management and administrative support, and have some of their expenses subsidized by investors and the government. It is also possible that PVOs and export development organizations could assist with the development of these programs in Egypt.

The goal of the Egyptian incubators is to foster entrepreneurship, and help transfer technology from the research lab to the marketplace. The incubator is a steppingstone – a means for small companies to minimize overhead while developing their business model and management team. It will provide subsidized access to the services including:

1. General Administration
2. Professional Services
   a. Legal
   b. Accounting
   c. Travel
3. Tactical Marketing Support
4. Business Development Support
   a. Sales Process Reengineering
   b. Distribution Channel Development
   c. Partner Development
   d. Opportunity Analysis
   e. Market Research
   f. Strategic Marketing
5. Interim Management

The incubators are designed to accelerate and improve the development of the early stage companies. Once the companies are up on their feet with proper management, strategic direction and funding, they will be moved out of the incubator and into the main software development park.

Funding (Companies)

The vehicles outlined in the Finance sections of the plan should provide the funding of companies inside the SDP. These will provide subsidy finance for start-ups and new companies needing help through the Export Software Organization and more substantial financing from if the commercial financing section.

Funding (SDP)

Funding of the SDP(s) should be an item high on the agenda of this plan. Developing a strategy to assist in this process will allow companies to compete on a world class basis. Even short-term issues such as poor Internet access and less than optimal facilities can be addressed by making a facility such as this available. Good working conditions and environment create a professional appearance and set the high standards that will make the industry successful.

We would recommend that the government along with other organizations would significantly subsidize the first SDP. Rather than remodeling existing facilities, we also believe that custom built premises for the software industry will set a new standard, and make a statement that the government and industry are serious about the initiative.

If private industry and banks can be encouraged to be a part of these first SDPs it would also set a tone of confidence and encouragement for the industry.

Benchmarking the Best Software Development Parks

We suggest that the Egyptian SDP committee (or an agent thereof) spend sometime in and around the successful software development parks in other areas of the world. By interviewing the people that run the parks, own companies in the parks, and work with companies in the parks, the Egyptian planners will better understand the components of successful SDPs. The SDPs that we recommend for benchmarking are:

Visiting parks in the Ireland, India and Israel would be an excellent first stage in the development process. This way Egypt can learn first hand of the issues that have worked and not worked in each of the areas, and fine tune the process and plans accordingly.

Starting the Process – Workshop Agenda

In addition to building a tour agenda for the Export Software Organization, industry, finance and government to attend these sessions, further work can be accomplished by building a start up conference for the Software Development Park scheme.

We would suggest that the following agenda for such an event, and that it should be chaired by an expert from one of the three countries listed above.

Agenda

1. Examples facilities

2. How they have worked for industries in other countries

    -       Speakers from Ireland, India, Israel

3. Operating the facilities

4. Financing alternatives

5. Target companies and profiles that have worked

6. Communications and support features

With a varied speaking group, with experience in the setting up, financing and development of parks, Egyptian industry, government, education and financial representatives can gain a good idea of the best facilities and practices out there in the market before starting the program here in country.

Costs

We would expect the staff operating costs for the Software Development Parks to be in the region of $1.75-2 million per annum. This is based on the following criteria:

Staff costs

Positions	Salary	Number of staff	Sub-total
Administration	20000	6	120000
Marketing support	40000	4	160000
Finance and legal support	60000	4	240000
Logistics	15000	6	90000
Interim and support management	200000	4	800000

Assuming benefits at around 25% of salary levels, we would expect the staff costs to run around $ million per annum.

Staffing	Equipment	Travel	Facilities	Other
$1,762,500	?	?	?	?

It is somewhat difficult to estimate exact costs associated with the SDP. Many issues have to be considered and agreed further. The size of the facilities? Will land be purchased or will it be donated? Who will pay or subsidize the Internet and telecommunication needs for the SDP? These issues need to agreed after the benchmarking of other facilities has begun, and after Egypt has run the start-up workshop for the program.

Once these areas are agreed, a budget can be drawn up with a much greater degree of accuracy.

Education

Overview

Education in Egypt

According to Harvard Computing Group estimates in 1998, which are summarized in the chart below, it would appear that university and government training programs are providing slightly more than the trained staff required to support the anticipated growth of 35% in the domestic software market and 200% in the overseas software development market. However, this appearance is extremely deceptive as there are actually critical shortfalls in all but one job category required for successful offshore programming company operation. The overproduction of entry-level programmers skews the statistics in all of the other categories.

In reality, there is actually a severe shortage of senior programmers and even the apparent oversupply of junior programmers is not adequate to meet industry needs because the training they have received has not been properly focused. Software company managing directors agree universally that students lack the following key attributes when they graduate from current computer science programs:

- understanding of team environments
- sophisticated problem-solving skills
- project management skills
- familiarity with some of the latest software products (e.g., database systems, programming languages, web technologies)

Certainly the Information Technology Institute (ITI) was created to fill this demand and generally succeeds in turning out more qualified graduates than the typical university program. However, software company managers find that ITI graduates, while better trained, are still too broad and too shallow to meet their immediate needs.

For example, ITI provides database training but not necessarily on the right products or in enough detail for someone to begin database programming after joining a software company. Additionally, the ITI curriculum is a bit too standard for most software companies. The graduates turn out only reasonably qualified and fairly homogeneous. A company looking for Oracle programmers will get candidates with the same training as another company that requires Sybase expertise.

It is also important to realize that training programmers is not the entire problem. There are key shortages of other personnel such as the middle managers required to support company growth beyond 10-20 employees.

The chart below shows the number of graduates per year from university and industry programs against the anticipated demand. Current training programs are not meeting even half of the demand in four critical categories. The recommendations in this section of the report are aimed at increasing not only the quantity but also the quality of graduates able to work in software companies.

Employment Need	Number Required	Number Produced	Annual Shortfall	Demand Met Now
Project Managers	116	50	66	43%
Product Managers	29	15	14	51%
Middle Managers	145	100	45	69%
Senior programming staff	377	200	177	53%
Entry-level programming staff	870	1500	---	172%
Business analysis and consultants	58	20	35	34%
Marketing management	58	25	23	43%
Sales and sales management	232	100	132	43%
Totals	**1885**	**2010**	**---**	**---**

Education in Ireland

For purposes of comparison, Ireland, with $1/20^{th}$ of Egypt's population, is producing 2900 technical graduates per year and has programs in place to increase that number by nearly 50%. There are, of course, significant differences in the economies, literacy rate and other demographic measures of the two countries, but even factoring those differences into the equation results in a staggering imbalance that will need to be corrected for Egypt to be a serious offshore software competitor.

Educational Institutions

Software Industry Institute

HCG recommends creation of a Software Industry Institute (SII) to act as a post-graduate supplement to university course work and well as a source of continuing education for software industry professionals. The Institute should be focused exclusively on the consensus needs of software companies for trained, ready-to-work professionals in the categories listed in the chart above.

Key to the success of the Institute will be a more flexible schedule and more frequent rotation of courses and faculty than is typical for a university program. Because SII is designed to meet the needs of industry, they will offer fewer of the introductory courses that a university can easily fill every semester and will concentrate instead on courses that might be offered only once or relatively infrequently. In addition, SII should be an "early adopter" of new technologies and be continually searching for new course topics that will assist Egyptian software companies on the leading edge.

The work proposed in the preceding paragraph is anything but easy. A large part of the financial return for an educational institution comes from offering repeatable courses. The second, third and fourth deliveries of a given course are each less expensive to package and deliver than the previous iteration. But SII's mission to be at the leading edge will require more substantial investment in new curriculum than is customary. The Institute will need to

continually recruit university faculty and industry experts from within and outside of Egypt to develop new courses (please refer to the sections below on staffing and financing).

Organization

SII could be an extension of ITI, it could be run by one of the universities in Egypt, or it could be created as a separate institution. The last approach is not as unusual as it may seem as there is certainly enough demand in the market to support multiple institutes, especially if they agree on focus areas and specialties with minimal overlap. For example, ITI could augment their current program to provide greater technical depth by including multiple database tracks and multiple programming language specialties. SII could focus on project management, sales and marketing, and development programs for middle managers.

Industry Advisory Board

SII should have an advisory board comprising representatives from

- 2-3 large software companies
- 2-3 small software companies
- 1-2 multinational firms
- 2-3 university computer science and management programs
- Information Technology Institute
- Member of the Export Software Organization
- IDSC, RITSEC and other appropriate government agencies

The advisory board will ensure that the Institute remains true to its charter of providing the most relevant possible software industry education.

The board should meet at least quarterly (more often during startup and the first year of operation) with members appointed for a term of two to three years on a rotating basis. The rotation scheme will prevent all board member terms from expiring in the same year.

Management and Staffing

SII will require a full time management staff and a relatively small full-time faculty. Most of the faculty will be recruited for terms ranging from one semester to several years and will come from Egyptian software companies, Egyptian universities, foreign universities and multinational firms. While managing a rotating faculty will be a big challenge, it will ensure the freshness and currency of the SII program.

Funding

Student tuition will not be able to cover the costs of running SII, especially given the higher than usual course development expense associated with the continuous development of pertinent subject matter. Consequently, government funding will be essential for the successful operation of SII. Foreign government funding may be an option as well, given that the purpose of SII is to develop an industry that will provide services both inside and outside of Egypt.

The Institute should actively seek corporate sponsorships and donations. Besides the obvious choices – cash, hardware and software – SII should seek donations of services

(maintenance, technical assistance, software upgrades) and even personnel. Many companies in the United States and Europe loan employees to universities and training institutes, either as technicians or as faculty members, because it generates positive publicity and gives them an early look at prospective employees among the student population.

Tuition Structure

The tuition structure will need to be evaluated as the Institute budgets are being prepared. Subsidies are very likely to be required, especially during the start up phases of the Institute.

Course Development

The curriculum for SII should be created by a team of industry experts from Egypt and other foreign countries, under the supervision of the Advisory Board and the management of the Institute.

Curriculum Examples

SII should offer courses in subjects like the following:

General Subject	Course Examples
Project management	• Project Management for International Development • Procurement and Contracting • Conflict Management • Risk Management and Quality Management • Hands-on Project Management Software • Managing at a Distance: Working with Distributed Project Teams • Effective Project Estimating
Business development for software companies	• IT Entrepreneurship • Technology and Operations Management
Marketing for software companies	• Marketing Management • Marketing and Information Technology • Strategic Database Marketing • Electronic Commerce in the Global Economy • Services Marketing • Managing Corporate Communications on the World Wide Web • Software Marketing Channels and Logistics
Advanced programming	• Multimedia Systems • Building Distributed E-commerce Applications
Database design and programming	• Object Oriented Modeling • Data Warehousing and Data Mining
Systems analysis and specification	• Techniques for Rapid Application Development • Advanced Design Methodologies • Structuring and Conducting User Interviews
Advanced product training for selected applications	• Oracle 8 • Sybase • Microsoft SQL Server, IIS, COM,
Management skills	• Management of Technology • Computer Security Controls and Ethics • Managing Systems Development Projects • Information Technology Policy and Management

Internships

SII should place heavy emphasis on incorporating internships into their curriculum. Many schools in the United States and other countries rely on student internships, especially when

the school's focus is on job placement for graduates. Having students and professors in continual contact with real-world software companies benefits everyone involved:

- Students can experience first hand the working conditions and job requirements of actual real world companies.
- Professors are continually updated on the technology and tools used by companies for whom they are producing graduates.
- Companies get low-cost student labor, and even more importantly, have an early look at potential new hires after interns graduate.
- Training institutions earn a reputation for relevance in the job market.
- Companies have the opportunity to hire graduates with the practical experience they require
- Students are more marketable on graduation.

Offshore Programming Lab

The Offshore Programming Lab (OPL) is designed to be a fully functioning offshore software development company with one critical difference – a high percentage of the staff are on temporary assignment from other software companies. The goal of the OPL is to provide a real-world environment for technical and management personnel to learn about the offshore programming business.

Assigned staff members will typically work at OPL for a period of nine months to allow sufficient time to learn and become productive. Following their stints at OPL, employees will return to their own software companies to implement the ideas and programs that they have learned during their OPL tenure.

In addition to full-time software company employees, OPL would provide an excellent venue for university or SII internships.

The Harvard Computing Group knows of no precedent for an OPL in any other country. Egypt has an opportunity to build something truly unique that should help Egyptian companies to gain a competitive edge more quickly than it would be possible by conventional means.

Location

The OPR should be located in the greater Cairo area due to the central location and the high concentration of software companies and universities.

Funding

OPL will be subsidized by the government as part of the investment to build a world class offshore programming industry. Each company that sends an employee on assignment to OPL will pay a fee to be determined in the future.

Staffing

OPL will require some permanent staff to maintain continuity, provide training and ensure the delivery of the highest quality software possible. Permanent positions for OPL will need to be determined as the charter and operation of the Lab are defined.

Curriculum

Training offered at OPL should not duplicate that offered at SII or in other programs. Instead, OPL training will focus on hands-on experience and applications and real-world projects. Assigned staff should be provided the opportunity to attend formal courses at SII or elsewhere, in order to apply their new knowledge to real world lab related problems.

The second emphasis for OPL programs, after hands-on, will be teamwork. Trainees will not work in isolation, but rather, in-group environments.

Teaching Personnel

The teaching staff at OPL would consist of a roving faculty. These could come from software operations around the globe, and eventually staffed by Egyptian software manager and technologists. It is likely in the early stages of the development of OPL that most of the staff will come from organizations that have built Software Factories in other competitive markets, or have run Software Engineering Institutes at large operations in the US and Europe.

Business feasibility

An important element to the success of this program will be the demand and support from Industry to develop the concept. The initial programs may be more limited if industry is unwilling to make the investment of placing staff in the OPL for a useful period of time. This needs to be tested further with existing and potential new investors in the software industry.

Sales and Marketing

There will be significant challenges in how the OPL address the issue of sales and marketing. It is highly likely that most of the initial projects will be government related. Only after the OPL builds a solid reputation and reference base will private clients be interested in contracting such services. The intentionally transient nature of OPL staff will only magnify this challenge.

Corporate sponsorship

There will be significant opportunities for corporate sponsorship in the OPL. As staff works in the labs, they will become exposed to tools that have been "donated" or subsidized by software vendors. This will create awareness and comfort level for developers and managers exposed to new systems that they may otherwise not have seen outside of the OPL.

Software Development Methodology

The use of a number of leading edge Software Development Methodologies and tools should be included in the curriculum of the program.

Enhanced Communication between Education, Government and Industry

The countries that have been successful in building an effective offshore development industry, most notably India, Israel and Ireland, have all shared one common aspect – "close cooperation between education, government and industry". Development of a comparable quality software industry in Egypt cannot happen in any other way.

As it stands now, the software industry is frustrated by the 6-9 months of on-the-job training they must provide to make new hire software developers productive. They are also frustrated by their inability to find project managers and middle managers, as well as marketing and sales people who know how to package, market and sell an intangible products such as software.

Harvard Computing Group recommends that the Export Software Organization serve as the focal point for better communication among the three parties.

Corporate Sponsorship

Establishing a closer relationship between universities and industry can only aid the progress toward a more sophisticated and successful software industry. In countries with successful software industries there are many donations of hardware and software to university and government sponsored training institutes. While there have been some donations of hardware to Egyptian universities, it does not appear to be a common practice. Donations of software are even more rare.

With government assistance in the form of tax breaks, a donation program can be extremely beneficial to all three parties.

- The university or training institute get hardware and software they might not have been able to afford under other circumstances, which allows them to provide training on current generation products.
- The donor company gets a tax break and creates a pool of graduates familiar with the latest versions of their hardware or software.
- The government gets a more rapid return on its investment in training subsidies and programs through the creation of a larger pool of more skilled graduates.

In India and other countries, corporate sponsorships even extend to the level of companies endowing faculty chairs at local universities, establishing and equipping labs, and funding scholarships for students.

Next Actions

Software Industry Institute

Harvard Computing Group recommends the following steps:

1. The Export Software Organization should form an advisory board with a composition similar to that proposed on page 93.

2. The SII Advisory Board should form committee to visit software and management training institutes in several other countries to find best practices. Potential places to visit include:

School	Program	Location
Bentley College Graduate School of Business	Information Age MBA	Waltham, MA, USA
George Washington University	Masters of Science in Project Management	Washington, DC, USA
Indian Institute of Technology	various	Mumbai, India
National Center for Software Technology	various	Mumbai and Bangalore, India
Center for Teaching Computing	various	Dublin, Ireland

1. The SII Advisory Board should write a charter for the Institute ensuring the greatest complementarily and the least overlap with ITI and other government, private or university training programs.

2. The Export Software Organization and SII Advisory Board should decide whether SII should be part of ITI, housed within a university, or run as a standalone institute.

3. The Export Software Organization and SII Advisory Board should interview and hire an initial staff to launch the Institute.

4. The Executive Director and Advisory Board of SII should prepare a budget and seek an appropriate level of government subsidy funding.

5. The staff of the Institute should actively solicit corporate sponsorship, endowments, hardware and software donations, and vendor employee secondment programs.

6. The staff of the Institute should establish internship programs with multinational and local technology companies as well as in IT departments of companies in other industries.

Offshore Programming Lab

7. The Export Software Organization should form an Advisory Board for OPL with similar composition to that of the Software Industry Institute.

8. The OPL Advisory Board should write a charter for the Lab.

9. The Export Software Organization and OPL Advisory Board should interview and hire an initial staff to launch the Institute.

10. The Executive Director and Advisory Board of OPL should prepare a budget and seek an appropriate level of government subsidy funding.

11. The staff of the Lab should actively solicit corporate sponsorship, endowments, hardware and software donations, and vendor employee secondment programs.

12. The staff of the Lab should establish internship programs with multinational and local technology companies as well as in IT departments of companies in other industries.

13. The staff of the Lab and the Advisory Board should develop a marketing plan for OPL services.

Enhanced Communication between Education, Government and Industry

The Export Software Organization should serve as the focal point for enhancing the communications and working relationship between various government agencies, universities, existing training institutes and SII and OPL.

Costs

The Offshore Programming Laboratory should cost in the region of $10-15 million dollars for start up capital. This should be enough to identify staff, build and market the programs, and subsidize operations for the first 12-18 months of operation. Once up and running, we would expect the operation to have a goal of profitability after the OPL has been running for 2 years. The costs of programs and facilities should by then being paid for by companies in the industry as a whole.

If facilities are donated, and the cost of Internet access and products and systems to support the program, then these costs may be lower. However, to develop a world class program, some significant initial outlay will be required.

The following table illustrates how some of these costs may be allocated in the first 18 months of operation.

Staffing	Equipment/ Software	Travel	Facilities	Other
$5M	$3M	$.3M	$4M	$2M

Depending on the scope of the program, this could be significantly higher than these estimates. We would expect demand to use the OPL should be high among leading and new firms entering the industry.

The Software Industry Institute should be carefully scoped out with the groups outlined in the action plan above. Dependent on the range and diversity of the charter and recommendations, the costs will vary enormously. It is difficult at this time to estimate what the cost may be, particularly if some of these requirements are met by commercial training firms, along with extensions to the current education programs already in place.

Software Business Development Centers

Introduction

One area that we believe is very important to the development of the industry is the local presence of companies in the overseas market. We believe that this is critically important to the success of the industry for several reasons.

A particular problem with the development of offshore industries, such as programming and manufacturing is the rate of change. Unlike other industries where there are physical boundaries separating components of the work, software development can occur on an intensely distributed basis.

Using the Internet effectively can reduce the need dramatically for local staffing, and the trend now starting to be known as "electronic immigration" is truly underway.

However, assuming that the rights skills are there in the country and that the price is right will guarantee success is not true. Today the offshore programming industry is a well-organized and understood mechanism. Most firms already have good representation in the local industry, they understand the market and have sales and project management specialists to meet the client's every requirement.

Egypt will take years to develop an effective industry if the only strategy is offshore programming with senior management visiting the target countries and clients one every couple of months. They will always be working to differentiate themselves, and most of this will be on price with other countries at the lower end of the price list. This will produce much pressure and causes the companies not to have "real clients" but instead sub-contracting arrangements. To avoid these problems, and accelerate the development of the industry, and provide the highest possible export revenue to the Egyptian firm, we recommend that an aggressive program be started to bring firms to the United States and European markets.

This program would be under a Software Business Development Center. Each of these centers will provide the information and support for the development of these programs.

Offshore Software Business Development Center

The formation and support of an Offshore Software Business Development Center (OSBDC) is intended to accelerate the growth of the industry in target markets. The Center will operate as a virtual company for the organizations it represents. The Center will provide:

Service	Details
Marketing and direct sales support	• Assistance with the development of company specific marketing materials including a web site and marketing collateral (brochures and business cards) • Direct sales support including client visits, tactical sales calls, and demonstrations
Business, management and strategy consulting	• Identify markets • Research potential partners
Operations support Including access to office space in the United States, where the following services will be provided or arranged:	• Administration: reception, telephone, fax, etc. • Computer facilities: printing, internet access, email, including the necessary hardware/software • Legal and accounting including attorney's fees • Immigration liaison for on-site off-shore projects • Finance: bank accounts and transfers • Coordination of travel and accommodations including: travel, car, lodging, cellular phone
Project support	• Project Management • Application Specification • Client Communication
Technology support	• Web maintenance • Preparation of software demo • Software virus protection • System back-ups

Sample functions from the Offshore Software Business Development Center

Locations

In the United States the primary locations for centers such as this would include:

- The North-East corridor (Boston, New York)
- Mid-Atlantic (Washington, DC)
- South East (Atlanta)
- Mid West (Chicago)
- West (Dallas, Austin)
- West Coast (San Francisco, Los Angeles)

From this list, the Northeast would make the most sense for the first location as it offers the largest overlap in business operation hours (usually 7 hours difference), permitting an early start to contact during normal hours in Egypt. Also, there is a major shortage of skilled IT labor currently in the Northeast, and a market that continues to show very high demand for staff.

Harvard Computing is very confident that this model with work effectively for firms that are ready to come into the development center. Companies wanting to do so should also be vetted to ensure that they are ready to for the transition to this new market and although the Center would be subsidized, the company should also be able to pay a considerable amount of the cost of the program.

In April of 1999, Harvard Computing Group used this model to assist in the start up of a new offshore subsidiary of an established Egyptian software firm. Within six months of the firms operation, they had three contracts in place with established and start up software firms in the United States. The firm expects to become profitable before year-end and will have a more than $1million backlog in contracts at the start of the next fiscal year. All of the components in this model were used in this process, with the exception of the subsidy model outlined above.

This model should allow Egyptian firms to compete more favorably with established Indian and other offshore companies that have an established presence in the US marketplace.

We also expect that this model would work well in a European setting, and given the price advantages over local labor, that Egypt can generate good revenue per employee and an excellent profit for this owners and shareholders.

Function

The OSBDC operates an both an intelligence arm for the Egyptian Software industry, and as a tactical incubator for firms coming to the US and International markets. Companies in the program will be vetted to ensure that they are ready to come to market in the location. If they do not either meet the necessary standards, then a program will be offered to them to provide the necessary improvements for successful entry into the marketplace.

As companies come to the US the OSDBC staff will set up appointments, provide support in the logistic set up of companies, teach Egyptian staff about US business culture and assist them in solving many of the problems that firms have in coming to the US and International market successfully.

The OSDBC will have a network of accounting, bank contacts, web development and graphic design facilities and other support programs to help the companies come to market successfully. In addition, the OSDBC will have facilities with access to their staff and regular training and simulation sessions to assist firms getting going in the marketplace.

Leads will be generated by the OSDBC, to assist new firms starting out in the target market. Staff will be available to assist the Egyptian firms going through their first year of operation in the target market. Once firms have enough momentum in the market and revenue and operations do not require the Center's help, they will leave the unit and set up their own dedicated facilities on-shore.

This model will allow Egypt to cost-effectively go to the target market in a very sophisticated way. It also will protect firms from pricing pressure and competition by having clients in the target marketplace.

Short/term long term

This initiative is one that could start very quickly with some form of subsidy for firms entering the program. Even without a subsidy, we believe that many firms would pay fully for such a program, because of the benefits that they derive from it.

Costs

For an OSBDC based in the US would cost around $300-$350K for each participating firm. In order to have enough momentum in the marketplace, we would expect a minimum of around 10 firms would need to be contracted over a 2 year period.

This would make estimated costs for the first years operation in the range of $3-$3.5 million to operate the unit. These costs would exclude travel and other tactical costs associated with sales related activities, these would be borne by the Egyptian firm in the program.

Financial support

Development of a financial support model for the Egyptian software industry has several elements. The plan will address many of these from the perspective of what is needed to nurture, develop and successfully mature the industry.

The financial support for the industry can be broken into three primary categories:

1. Seed capital support for the development of new companies focused on software activities

2. Venture capital support to assist with the development of new firms

3. Short and long term support for operating and expansion capital

Seed capital and start-up funds

There is a need for start-up funds for new companies operating in the Egyptian marketplace. These funds should be administered by the Export Software Organization, which would also provide a review body to determine which companies should receive grants and assist with the development and refinement of their business planning process.

These start-up funds could be provided by a combination of private support and government. It should also ensure that some level of new start ups have access to these funds, along with business development courses to assist in the appropriate business planning processes to support them.

It is recommended that a financial advisory group from the United States be identified as advisor to the Export Software Organization and the Government to assist in building the framework for these funds. However, some basic requirements for receiving and using these funds could include:

- A pre-defined criteria for the start-ups Business Plan. (Including making use of Export Software Organization's Market Research Services)
- Inclusion in Software Development Parks incubator program. This will provide assistance to companies in many essential areas during their first 12-18 months of existence. (Ireland has been very successful with these programs, and produces more than 48 no-fail start-ups through this program)

The start-up environment for firms in this sector is a very difficult area to address for a number of reasons. The market data to enable firms to understand where to focus their business in terms of skills and industry is not available. In addition, the lack of access to tools and finance cause only the really brave entrepreneurs to enter the market. Incubation of these firms occurs on a case-by-case basis, often with relatives and close friends providing temporary office space and financing. Many of the firms trying to enter the market, also focus on the domestic market, already crowded with players seeking another price of a small sector. It is recommended that the start up funds should focus exclusively on the export sector, where high potential returns are available from a huge marketplace.

The "seed" fund is likely to provide small and diversified start up capital of around $100,000

per individual company start. This would complement other early stage capital for the target firm.

Venture Capital and industry expansion

During the course of developing this plan, Harvard Computing has discussed the issue of obtaining external venture funds for the development of the Egyptian software industry. Given that Egypt is not recognized as a significant player in this industry today, and there is little or no activity in the local market to fund software firms some important principles need to be understood to obtain foreign investment.

It is our belief that there will be limited investment of US based venture capital to the Egyptian software industry without the following caveats being in place.

- The venture fund will have to become comfortable with an offshore model that provides confidence to those investing in the industry

- There is a strong preference to invest in US based companies that have their development resources located in Egypt. This effectively makes the investment a US based decision, with the exclusive rights to these services being controlled through the US outlet.

- We believe that certain US based venture funds could be convinced to enter this market, with careful screening of the firms requiring financing. These firms will have to clearly understand the different nature of venture capital funding in the US market and the expectations that go along with bringing venture capital into a company. Some of these include

  - Venture funds usually only stay in a firm for around 3-5 years

  - Most deals involve more than one VC firm, with one leading and others taking a smaller part of the total financing round

  - Venture funded companies in the software industry usually have very aggressive growth and return on investment expectations. This puts a great deal of pressure on management and staff to perform to the plan that brought the money into the company.

  - Despite the reputation, most VC firms are risk adverse, and look at hundreds of business plans each year, while only investing in a few firms.

In addition, it is recommended that the venture fund would work closely with the Export Software Organization in selecting the firms for funding. This would work in a similar way for both "seed or early stage funding" and later stage deals that are more traditional.

We recommend that the operation of this fund and decisions of how best to take advantage of how it would operate is illustrated with the following table. Each stage would provide checks and balances for the investors and the providers of capital. It would also permit a clear method of ensuring that the program would work effectively in the management of US based venture capital.

Over the past 6 weeks Harvard Computing has tested this model out with two potential investor groups, one of which would also potentially be able to provide facilities in the United States for the development of new offshore start-up companies.

In addition, Harvard Computing has completed the successful incubation of an offshore start up in United States. The company is currently selling offshore programming services in the US marketplace. This firm will become profitable before the end of 1999, just eight months after its formation. It is likely to produce export revenue more than several million dollars within the next 24 months of operation.

With the appropriate assistance, we believe that this operation can produce a wide range of export oriented start-ups from the cadre of suitable firms already in the industry. More importantly it will create the right environment for new companies to begin operations in Egypt and in the United States and other overseas markets.

Function of Venture and start up operations and stages

Export Software Organization	Venture Fund	3rd parties
1. Marketing the concept, identifying target firms	1. Building the fund	1. Providing facilities (SFS)
2. Initial vetting of firms	2. Ensuring balance in portfolio	2. Sub-contracted due diligence where appropriate
3. Recommendation to invest	3. Approval of investment	3. BOD agreement
4. Start up support	4. BOD support and disbursement of funds	4. Interim management
5. Business development support	5. Oversight and advise	
6. Informing fund managers of progress/issues	6. Informing investors	5. Investors and BOD agree
7. Defining exit readiness from Incubator	7. Making the exit happen	

Example of Venture Capital operation and decision making process with incubator and start up funds

Operating and Expansion capital

Providing operating and expansion capital for the development of companies in the software industry continues to be a problem. Some of this is based on the problems that individual banking institutions do not understand what the complex capital requirements are for software firms. (Many firms have to invest heavily in product development well in advance of any royalties or sales of the system.).

Other issues are that many financial organizations, banks and accounting firms place little or no valuation on the intellectual property that is the most important asset in a software company.

For these reasons, it would appear that the best method of providing these skills to the country would be to develop a bank, or branch of a bank in Egypt dedicated to the software industry and its particular needs.

There are some very good models that could be followed in the United States that will provide input to this process. Once such bank (who may be persuaded to assist or provide consulting support is Silicon Valley Bank.)

As Silicon Valley Bank focused on providing a complete range of services to the Technology community, we believe that this model is one that would work well in the Egyptian marketplace. Silicon Valley Bank set out in 1983 to capture a growing market in Northern California that until that time had been greatly underserved by commercial banks -- emerging growth technology companies in the Silicon Valley. Many companies in this unique market were just getting started and had yet to realize a profit; some simply were not yet considered "creditworthy" by local community or regional banks.

Since that time, Silicon Valley Bank has established a national reputation for excellence in the banking industry, based on a high level of expertise in a number of technology and life sciences niches. With a solid understanding of the true risks and rewards of emerging growth companies, the Bank is widely recognized for its ability to develop innovative approaches to meet clients' lending challenges. Building on its successful experience in Northern California, the Bank has expanded to additional major technology and life sciences centers around the country, as well as to other underserved markets.

They with a broad spectrum of software clients and virtually all the top start-ups in the software industry.

Their clear understanding of the requirements in the software technology space, industry positioning, OEM opportunities, gross margins, and acquisition and IPO strategies translates into quick solutions for your company's needs. It also means your company gets the right level of financing at each stage in its life cycle.

The services required by the Egyptian industry mirror those of the software industry in the United States, these include:

- Cash management
- Commercial Financial
- Leasing
- Vendor financing for products
- Real Estate
- Direct leasing services

We recommend that a delegation from the industry planning group invite a financial consulting group. (MDT Advisors, of Cambridge, MA) to host a seminar in the Cairo area to review these issues over the course of a two day conference to review these issues. It may be possible to have multiple representatives on this team, perhaps even bringing in a

representative from Silicon Valley Bank to review how they set up their operation and the specifics that have worked to assist in the development of the software industry in the USA.

It would also make sense to try and bring more Egyptian bankers onto the Board of Directors of Egyptian software firms. This will provide tactical education and practical experience to both sides. It may also increase the willingness of Egyptian banks to directly invest in software companies.

Other Financing Requirements

In addition to the development of the seed, venture and expansion capital requirements, there are also a number of other areas that will require funding to ensure success in the targeting of the right industries and continued support.

These include funds for Market Research, project funds, student financing and liability funds.

The following table illustrates the purpose of each one of these funds, and how they may assist the development of the industry.

Fund	Purpose
Market Research	Would be used to develop, acquire and deliver relevant market research data to the industry through the Export Software Organization
Project Funds	Specific funds for large development projects that are outside the scope of individual firms current financing options.
Student Financing	Subsidies for students attending colleges and institutions of higher education related to the development of the software industry.

In addition to these funds, it is also recommended that liability insurance be made available for firms participating in projects in overseas markets.

Short term and next stages

The development of a conference to review these financial issues is a logical next step in this process. Such a conference should focus on the three main areas outlined above in the Financial recommendations. A two-day conference to address these issues could include representatives from the following groups:

From Egypt:

- Trade and Industry
- Ministry of Finance
- Software industry
- Education
- Commercial banking

From the United States:

- Advisory group to overview the seed capital and venture market opportunity
- Commercial banking group with expertise in the software and technology fields
- This conference should be able to be co-ordinated within a 60 day timeframe.

The financial field is an important area to address if the industry is to grow in the future. Today it is very difficult for new companies to get started, and existing ones to expand, without these changes the development rate for the country will be greatly impaired.

Software Industry Development

There are significant opportunities to enhance the software industry trade group and make this group a parallel body to the Egyptian Export Software Organization that would effectively develop and promote the industry inside and outside of the country.

The goals for this group would promote the industry effectively and would be modeled on the very successful groups in Israel and Ireland.

Building a framework for joint action between a representative industry association and the Export Software Organization could create some tremendous synergy and powerful action linking the industry needs with a co-ordinated development of the industry.

We recommend that reviewing this issue should become a high priority for the Export Software Organization and current industry bodies such as ESA and EHITA for further discussion and development.

There are also other groups, such as the Internet Service Providers and Education companies in the industry that should be encouraged to join such a program.

Summary

The recommendations in this report cover a very wide range of subjects and areas. We believe that they require aggressive action in order to meet the goals of the plan, the creation of a whole new export opportunity for the country.

The following table provides a summary of the highlights of each section of this document and the plan, a plan that will require significant commitment and resources to give birth to a new industry and opportunity.

	Primarily Government Led	
1.	Export Software Organization	Includes the mission, charter and operation suggestions based on success in other countries. Included is an action plan for steps to develop the Organization and recommended participants and their roles.
2.	Internet and E-commerce Changes	This include steps and potential members of the appropriate working groups, and potential technology alternatives and steps for Egypt to consider. Some recommendations may provide some shorter term solutions for the resolution of the Internet problems as they relate to Internet access and performance.
3.	Domestic Growth	Recommendations for items that will create some increased demand for domestic growth in the software sector.
4.	Regulatory Reform	
4a	Intellectual Property Rights	Recommendations of steps to review where best to make changes to law in future. Recommendations for groups that can help make the change occur quickly. Extensively references how other countries have dealt with many of these issues. Details of how working groups would co-operate to engineer these changes.
4b	Customs Laws	
4c	Tax laws	
4d	Financial incentives (government)	Definition of how to potentially implement some of these systems with detailed recommendations for goals in this category.
5.	Export Promotion	
5a	Trade policies	Recommendations of steps to review where best to make changes to law in future. Include recommendations for groups that can help make the change occur here quickly.
	Includes Government and the Private Sector	
6.	Software and Development Parks	Development of next steps for the scoping and development of Software Park model. This will include a step by step plan for the identification of components and basic characteristics of first Park.
7.	Software Incubators	Development of next steps for the scoping and development of Software Incubator model. Includes plan for the identification of components and basic characteristics of the first Incubator.
8.	Education System changes	Draft of potential curriculum subjects, objectives, who would present the courses, where and timing of implementation of changes recommended.
	Private Sector Led	
9.	Offshore Software Business Development Centers	Development of model to illustrate operations, costs and strategy behind Offshore Business Development Centers.
10.	Financing Alternatives and Funds	Step by step action plans to start this important aspect of the industry's growth.
11.	Software Industry Development	Additional recommendations for this key function for software industry development.